

Subterranea

April 2008 Issue 16

ISSN 1741-8917 £4.00

In This Issue...

HMS Wildfire

Dudley Canal Tunnels

Gottow & Juterburg

Chislehurst Caves

Books, News
and Reviews

The Magazine of Subterranea Britannica
www.subbrit.org.uk



Subterranea Britannica is a society devoted to the study of man-made and man-used underground structures and the archaeology of the Cold War/ The main focus of interest is on abandoned and forgotten structures and in the case of Cold War structures studies are entirely confined to declassified and decommissioned structures. The society is open to all and its membership includes all walks of life. Members are invited to contribute to this magazine even if this just means sending very welcome snippets from Newspapers and magazines.

Editor: Nick Catford 13 Highcroft Cottages London Road Swanley Kent BR8 8DB
e-mail Nick@Catford.fsbusiness.co.uk

Contents

News		Three Tunnels _____ 37	
Conservation & Heritage _____	5	A Day on the London Underground _____	38
Defence & Military _____	7	Dudley Canal Tunnels _____	46
Mines & Quarries _____	8	Communal air raid shelter _____	50
Tunnels & Tunnelling _____	10	Coober Pedy, South Australia _____	52
Publications _____	12	Opal Prospecting in Coober Pedy _____	54
Features		Local Legends _____ 55	
Blackheath Hill Railway Tunnel _____	18	Gottow and Juterburg _____	56
HMS Wildfire _____	21	Istanbul's high risk tunnels _____	60
Erith Hospital _____	32	Chislehurst Caves in World War One _____	61
Nevill Street, Southport _____	34	Underground features - Swedish Railways _____	65

Front cover photo: This picture of the central plotting room at HMS Wildfire as it now stands well demonstrates the curved structure of the room as seen through the upper cabin windows and the false ceiling over the plotting area. The extent of the overhang of the later, upper cabins is well illustrated. Despite the shabby derelict appearance of the room there is very little structural damage. Note the charring on the edge of the plotting table.

Rear cover photo Top: Underground ticket office that was provided for interchange between the City & South London Railway and the Charing Cross, Euston & Hampstead Railway at Euston Station. It was closed when the two lines came under joint ownership in 1913. The subway was closed in 1969 when the station was remodelled during the construction of the Victoria Line.

Rear cover photo Bottom: The upper gallery of Dark Cavern, Castle Hill, Dudley looking south in the thick bed limestone. The canal ran most of the length of the lower gallery. Dark Cavern was completely infilled with sand in the 1990's.

Pictures by Nick Catford

Honorary President: Prof. C. T. Shaw
Chairman: Martin Dixon
Vice Chairman: Linda Bartlett
Secretary: Roger Starling
Membership: Nick Catford
Treasurer: Sue Monsell

Editorial Team:
Editor of Subterranea: Nick Catford
Editorial Assistants: Martin Dixon & Linda Bartlett
Layout: Martin Snow

Committee:
Linda Bartlett: Study Weekends & Admin Support
Martin Dixon: Study Weekends & French Trips
Brian Hillman: Day Conferences
Bob Templeman
Paul W. Sowan
M. C. Black
Ex Officio:
Gavin Saxby & Richard Lamont: Web site managers
Andrew Smith: Mailing Coordinator
Richard Lamont: Mailing List Manager
Hugh Ainsley: Net Admin

Newsletters of Subterranea Britannica are published by the committee of Subterranea Britannica. Original articles, book reviews, press cuttings, extracts from books and journals, letters to the editor etc. are welcome.

However the editor reserves the right not to publish material without giving a reason.

The committee of Subterranea Britannica and the editor do not necessarily agree with any views expressed and cannot check the accuracy of any material sent in.

Printed By Hillary Press Ltd. 75 Church Road Hendon London NW4 4DP
Telephone: (020) 8203 4508 Fax: (020) 8203 0671



GUARANTEED SUCCESS!

The recent General Meetings of the society voted to change the legal status of Subterranea Britannica by 'incorporating' the society as Subterranea Britannica Limited. This is in line with the direction given and the motion passed at the 2005 AGM. Subterranea Britannica Limited is a company without share capital, limited by guarantee (registered number 6447148). Established members of the committee have become Directors of Subterranea Britannica Limited.

It was felt prudent to make this change to help protect the committee and other organisers against any future legal action or claim. In effect, the liability of all members is now limited to £1 ('the guarantee'). This, of course, is no protection against actions that are illegal or negligent. The constitution has now been transformed into a 'Memorandum and Articles of Association' in line with

company law. The only changes that have been made are minor – to correct inconsistencies or bring clarification.

Our new status also makes it easier for the society to own assets such as the Subterranea Britannica Collection and to enter into contracts as a legal entity. The extent to which we exploit this is a matter for the committee, guided by members. The 2005 AGM also gave approval for Subterranea Britannica to seek charitable status. The pros and cons of this further move are being considered. Any proposals will be brought to a future General Meeting for endorsement.

We are grateful in particular to Sue Monsell (now Company Secretary as well as Treasurer) for her sterling work in preparing all the paperwork and filing necessary for the move.

SUBTERRANEA BRITANNICA DIARY

Summary of Forthcoming Events

Sub Brit specific events

Friday 30th – Monday 2nd June SB trip to Paris

Saturday 19th – Sunday 20th July - Charterhouse caving weekend

August 2008

“Subterranea” 17 published ** Copy deadline 15 July **

Friday 5th – Monday 8th September 2008

Study Weekend, East Yorkshire

Saturday 20th September – Open day at Paddock (north west London)

October 2008 ** *date to be confirmed* **

Autumn Day Conference, ** *location to be confirmed* **

December 2008

“Subterranea” 18 published ** Copy deadline 15 November **

General events

4th – 6th July 2008 NAMHO conference EDINBURGH

13th – 14th September 2008 Heritage Open Days

19th – 21st September 2008 S.F.E.S Conference - France

20th – 21st September 2008 London Open House

26th – 28th September 2008 - Hidden Earth, OTLEY, West Yorkshire

QUARRY 2008 UPDATE NOW ON SUBTERRANEA BRITANNICA WEBSITE

This file (Quarry.doc) of bibliographical references relating to the extractive industries of the British Isles has now been updated to 19 February 2008. It is a very large textfile (9856 kb) equivalent to 1,921 pages, listing over 35,000 bibliographical references to published work on the geology of the British Isles (including the Channel Islands, Isle of Man, and the Republic of Ireland as well as the United Kingdom. Opencast and underground mines and quarries are included, the emphasis being on mineral products other than fuels and metalliferous ores. It is at <http://www.subbrit.org.uk/sb-sites/> .

SWEDISH VERSION OF SUB BRIT FOUNDED

After being a loose group on an internet forum over the previous 18 months, the Swedish Fortification Historical Society was founded on the 20th October 2007. A magazine will be produced, first as a pdf document but later as a hard-copy magazine. The forum has more than 31,000 postings about all types of Swedish fortifications, as well as information from abroad.

The society will have Subterranea Britannica as one of its mentors and will try to arrange trips within Sweden - as well as abroad; and also have an annual study weekend. For further information see www.fortifikation.se (website in Swedish) or contact info@fortifikation.se

S.F.E.S CONFERENCE, SEPTEMBER 2008

Soci t  Fran aise d'Etudes des Souterrains

Sub Brit has had exchange membership with SFES for many years. The 31st Congress (Conference) of this French underground organisation takes place from 19th – 21st September 2008, in Amiens, in the Somme region of France. There will be a chance to discover some of the 'muches' (underground homes) of Picardie, along with presentations by members of the society on recent aspects of their work and discoveries underground. The talks are almost always in French, but are usually interestingly illustrated. Sub Brit has also visited this area of France, on some of the excursions over the past few years – so if you enjoyed visiting the muches then, here is a chance to explore a few more.

Various members of Sub Brit have attended the SFES conferences over the years, and it is likely that we will be going again this year.

There is a website (www.chez.com/sfes), which will have more information and booking forms in due course.

LONDON TRANSPORT MUSEUM REOPENED AFTER TWO YEARS' REFURBISHMENT

The London Transport Museum at Covent Garden reopened on 22 November 2007 after HLF £22m refurbishment in the last two years.

SOURCE: LONDON TRANSPORT MUSEUM, 2008, London Transport Museum reopens. *Industrial Archaeology News* 144, page 14.

WEALDEN CAVE AND MINE SOCIETY 'CAVE DAYS' AT REIGATE, SURREY

There will be guided tours of the Barons' Cave at Reigate Castle, and the Tunnel Road (east and west) silver-sand mines on the following Saturdays in 2008 (10.00 to 16.00): May 10th June 14th July 12th September 13th

A charge is made for admission to the guided tours.

A new display incorporating a reconstructed length of Croydon, Merstham & Godstone Iron Railway track and the Reigate stone industry is now in place.

Further information may be had from Wealden Cave and Mine Society, on 01737-243912 or at andy.belcher@wcms.org.uk / and see the website <http://www.wcms.org.uk> Group visits can also be arranged at other times.

NAMHO 2008 IN SCOTLAND

The National Association of Mining History Organisations, of which Subterranea Britannica is a member, will be hosting the 2008 mining history conference and field meetings (including underground visits) based at the Scottish Mining Museum, Lady Victoria Colliery, Newtongrange, about nine miles south of Edinburgh, over the weekend 12th – 13th July.

Mine visits currently in prospect during the weekend are as follows:

1. Birkhill fireclay mine No. 2.
2. Leven Seat limestone mine.
3. Cults limestone mine.
4. Bowden Hill limestone mine.
5. Hilderston 'silver' mine.
6. Alva silver mines.
7. Linhouse Water shale mine.
8. Whitequarries and Philpstoun shale mines.
9. Tarbrax opencast quarry.

During the following three days, Monday – Wednesday 14th – 16th July, it is suggested there may be additional organised visits to such sites as Craiglea slate quarry (Perthshire), Tyndrum lead mines, and the lead mines at Leadhills (Lanarkshire) and Wanlockhead (Dumfriesshire.)

SOURCE: Alan JEFFREYS, 2007, NAMHO 2008. *Newsletter Grampian Speleological Society* 133 (December 2007), page 8.

WESTERN HEIGHTS (DROP REDOUBT) OPEN WEEKEND AT DOVER, KENT

There is a rare opportunity to visit the Drop Redoubt, the most impressive part of the Western Heights fortifications overlooking Dover, during the weekend Saturday and Sunday, 31st May and 1st June, when the Western Heights Preservation Society, by arrangement with English Heritage and Dover Council, will open the site to the public.

The sculpted, tunnelled, and fortified hill comprises a series of forts linked by 'miles' of masonry-lined ditches. Construction commenced during the American War of Independence, and continued during and after the Napoleonic Wars. During the weekend parts of the Drop Redoubt will be open to visitors, as will the triple-spiral staircase nearby known as the Grand Shaft. Entry to the shaft (offering access to and from Snargate Street at beach level) will be free, and a small charge will be made at the Redoubt, which contains casemates and barracks. Regrettably, wheelchair access is not possible, and prams and push-chairs cannot be admitted. Visitors should come suitably shod for uneven or rough ground. There is limited parking space on Military Hill nearby.

The Western Heights Preservation Society, a voluntary group established in 2000, will open the fort to visitors with the permission of English Heritage, and the Grand Shaft with the permission of Dover Council. Further information can be obtained from the Western Heights Preservation Society, PO Box 366, DEAL, Kent CT14 9XY or from Dover Museum on 01304-201066.

SOURCE: WESTERN HEIGHTS PRESERVATION SOCIETY, 2008, Western Heights open weekend. *Newsletter Chelsea Speleological Society* 50(2), page 20

SCIENCE MUSEUM LIBRARY RELOCATED TO WROUGHTON, WILTSHIRE

Most of the vast and important stock of the Science Museum Library has been relocated from Imperial College, South Kensington, to a site on the southeast of Wroughton Aerodrome near Swindon, where the library was reopened on 7 December 2007. The store, a former hangar, has 18 km of shelving. The facilities include a public reading room, with seats for 30, although unfortunately it is far from easy to reach by public transport! The library is freely open to the general public. The library stock of 420,000 items includes more than 6,000 books or manuscripts dating from before 1800. There are still facilities for researchers at South Kensington, and a daily shuttle service will deliver most items from Wroughton given 24 hours or so notice.

SOURCE: Robert CARR, 2008, New Science Museum Library at Wroughton. *Industrial Archaeology News* 144, page 14.

OPEN DAY AT OLDWOOD PITS, GLOUCESTERSHIRE

South Gloucestershire Mines Research Group will have two open days at Oldwood Pits Colliery, near Yate on Sunday 18 May and on Sunday 14 September 2008. The site will be well signposted locally on the day. Guided tours of the site led by members of the SGMRG every half hour from 10am onwards, last tour at 4pm. Visitors will also receive details of the history of the site to take home.

Guided tours do not go underground (it's flooded!), but you will see the entrance to the drift mine, the top of the mine shaft, spoil heaps, base of chimney, remains of some buildings and we have a good collection of artefacts and displays about mining in South Gloucestershire.

The pit was operated between 1867 and 1889; it had to close when the water level rose after pumping was stopped at the nearby Yate mines.

FURTHER EAST SURREY QUARRY MYSTERIES SOLVED?

Exploration of the very extensive network of underground building-stone quarry tunnels running either side of the old pre-1933 Chaldon – Merstham parish boundary in east Surrey has yielded relatively few artefacts. Mostly these have been iron wedges (some still *in situ* in working faces), a single iron pick (see *Newsletter Surrey Industrial History Group* 29, p. 3 (1985) and *Bull. Surrey Archaeological Society* 215, page 5 (1986)), ox- and pony-shoes, part of the iron brace for a wooden-bladed shovel, some ceramic material, and a number of clay tobacco pipes. Of less obvious purpose is a large box cut out of a single block of stone, with a well-fitting stone lid. This was found lying on backfilled quarry waste in a worked-out gallery near the working faces at the bottom of a long haulage tunnel running down-dip from a former entrance near the junction of Hilltop Lane and Springbottom Lane (TQ 313536) in what was Chaldon parish, but Bletchingley since 1933. The once-negotiable entrance at nearby Rockshaw Lodge has now been very effectively blocked, so the location (near a chalked graffiti dated 1609) can now only be reached by way of a tortuous and low underground route from an entrance further to the west.

Peter Burgess, in his review of a recent book on underground quarries near Cheltenham, has drawn attention to a similar stone box found in the Whittington district, which has been interpreted by Arthur Price as a secure and dry place in which to store candles, tinder, flint and steel. Relighting an accidentally extinguished candle in a damp underground quarry, before the days of striking matches (a nineteenth-century invention), would have been challenging with other than dry materials.

His mind having turned to the question of underground lighting, Peter has reconsidered the narrow vertical niches (generally in groups of three) found cut into the quarry walls just inside or near the former (but now blocked) portals of the quarries below and either side of Godstone Hill (the A22) in the Godstone Quarries, now generally thought to have been commenced in or around the 17th century. These have for some years been interpreted as places for lighted candles, although why they should be needed just inside an entrance where daylight reached was a puzzle. One theory is that lighted candles were placed here after dark so that men or horses would know



they were approaching the quarry exit at night (perhaps three candles in case one or two got blown out?) However, it is easy (certainly for men, and perhaps also for horses) to recognise proximity to an exit, as the air is sensibly fresher. Peter's new suggestion is that quarrymen would deposit their lighted candles here during brief excursions to the outside. This would have saved the trouble of re-lighting the candles with a flint, steel, and tinder.

SOURCE: Peter M. BURGESS, 2008, Book review – and a puzzle solved! *News of the Weald* 70, page 4 [*News of the Weald* is the newsletter of the Wealden Cave and Mine Society]

ANOTHER EAST SURREY QUARRY MYSTERY

Arch quarry is an extensive underground working on the west side of the road (A22) up Godstone Hill in east Surrey. The original walk-in entrance from an open pit has been buried under back-fill (pulverised fuel ash from a power station) since the 1950s. Access is now only possible via a deep narrow shaft built of concrete rings (without step irons) through the fill, and is controlled by Tandridge Council.

Don Wood, of the Wealden Cave and Mine Society, has recently described a visit to one of the least accessible parts of this extensive subterranean labyrinth, and published a photograph of one of the most interesting features of the entire system. Cut off from open tunnels by extensive falls of roof, so reachable only by crawling through very low spaces, there is a substantial stockpile of 16 or more very large rectangular slabs of stone, featured in the photograph. These slabs are of various sizes and thicknesses, apparently up to four feet or so long, two to three feet wide, and eight to ten inches thick. They evidently represent a sample of the shapes and sizes of cut stones taken from the quarry before the roof collapses. Similar slabs are known from the same locality from photographs in a feature article about hearthstone mining by one H.L. Adam published in 1901.

The slabs look too big to have been intended as building-stone, unless they were to be cut to smaller sizes outside the quarry. One notion is that they served some function in glass factories, although almost certainly not in contact with molten glass. They may have been used in connection with shaping or forming cooling but still plastic glass into sheets or containers.

SOURCE: Don WOOD, 2008, A trip into Arch quarry. *News of the Weald* 70, page 4 [*News of the Weald* is the newsletter of the Wealden Cave and Mine Society]

SOURCE: H.L. ADAM, 1901, Three lumps a penny - how London is supplied with hearthstone. *Black and White Budget*, 13 April 1901, 74 - 75 [reprinted in the West Sussex Geological Society's journal *Outcrop* 6, 13 - 15 (1990)]

GODSTONE HILL QUARRIES SURVEY COMPLETED, EAST SURREY

A small team of Wealden Cave and Mine Society members has recently completed an archaeological-recording quality survey of the Godstone Hill underground quarries, which lie mostly below and east of the A22 at Godstone Hill in east Surrey. The principal surveyors were Chris Bailey (an Honorary Member of *Subterranea Britannica*) and Peter Burgess, with Paul Sowan (Chairman) taking the zero end of the surveying tape to the far ends of tunnels and nasty low places (the zero end meaning he isn't given the responsibility for reading distances off the tape, where he might get confused!)

There are an estimated 12.8 km (eight miles) of tunnels in this system, which has been described in *Subterranea* 3 (2003), 15 – 17. The system appears to have commenced as an underground building-stone quarry, and subsequently supplied refractory slabs for glass-houses, before adopting a new role as a hearthstone mine and then as an underground mushroom farm.

REFERENCE: Paul W. SOWAN, 2003, Godstone mines Sub Brit visit report. *Subterranea* 3, 15 – 17.

ANOTHER 'SECRET TUNNEL' THEORY DEBUNKED AT EYNSFORD, KENT

Excavations in the garden at the Five Bells public house at Eynsford, made in connection with building a covered shelter for smokers no longer allowed to indulge their habit indoors, revealed a brick vault, immediately giving rise to the possibility that this was one end of a 'secret tunnel' to the parish church 500 metres away. Investigation by the Kent Archaeological Rescue Unit led to the feature being interpreted as a soakaway.

ANON, 2007, Smoking ban reveals mystery structure. *Kent Archaeological Review* 170, page 211.

TUNNELLING IN SILBURY HILL, WILTSHIRE

Silbury Hill is an enormous man-made hill, a conical mound with a flattish top, apparently built between 2400 and 2000 BC. It is located about a mile (1.6 km) south of Avebury, at SU 0968, and 20 miles (32 km) north of Stonehenge.

The mound covers 5° acres (2.23 hectares), is 550 feet (170m) in diameter, and 130 feet (40 m) high, with a flattish top about 100 feet (30 m) across.

In May 2000 it was reported to English Heritage that a crater had formed in the top of the hill, and that cavers were abseiling into the interior. This shaft was the result of the running-in of an exploratory shaft sunk in 1776 at the behest of the then Duke of Northumberland who was, however, disappointed to find neither burial nor grave goods at the centre. A second exploration was made in 1849 by one Dean Merewether [John Merewether [1797 – 1850] Dean of Hereford] for the then recently formed (1845) Archaeological Institute, from 1866 the still-existing Royal Archaeological Institute. Merewether's

workmen tunnelled into the hill horizontally, but again found nothing very exciting at the centre. A third tunnelling project in 1968 – 69 was undertaken, at the suggestion of David Attenborough, then Controller of BBC2, by the leading prehistorian Richard Atkinson. Regrettably, this project was terminated short of completion, and the archaeological findings were not adequately written-up and published (although a report was published by Alasdair Whittle based on Atkinson's surviving but incomplete notes in 1997.)

On the premature cessation of investigations in 1968 – 69, the outer part of the tunnel (supported by steel arches) was back-filled with roadstone, but the inner part including side tunnels making a cruciform void at the centre was left empty for the convenience of future archaeologists. The shaft and the two tunnels have, since then, led to considerable instability and movement within the mound, resulting in cracks appearing, and the 1776 shaft running into the central chamber left in 1969.

Recent investigations and action on behalf of English Heritage have been primarily to remedy the damage caused by the three previous 'archaeological' interventions, although some valuable archaeological information has been retrieved. The work commenced with the shaft being blocked by large polystyrene blocks, and is being concluded by pumping chalk slurry into all reachable voids and the tunnels themselves. Some foamed resin has also been used.

What is now known is that the hill was built in three main stages, dated between about 2400 and 2000 BC from radio-carbon dating of antler picks found in the chalk rubble. At first there was a small turf mound (made at about the same time as the first phase of Stonehenge), evidently containing no burial and no 'treasure.' This was later covered by a much larger chalk mound, at which point the monument was surrounded by a ring ditch (presumably the source of the chalk used) up to six metres deep. In due course the structure was enlarged to its present size, with even more chalk (where from is not clear from the reports cited), as a result of which the ring-ditch was filled again. There is also some evidence that the land surface on which the mound was built has previously been an occupied site, as stake-holes, small pits, and a small 'satellite' mound have been found. It is also known that the mound was used in Roman times as a sighting station for the construction of what is now the London to Bath road (the modern A4.)

This is a sorry story. Archaeological excavation unavoidably destroys evidence and, in this instance, has additionally endangered the integrity of the un-excavated parts of the monument. And archaeological excavation (and thus destruction of evidence) which does not result in carefully compiled and preserved records and published reports is no more than vandalism.

SOURCE: Michael PITTS, 2007, Secrets of Silbury poet revealed. *British Archaeology* 98, 8 – 9.

SOURCE: Amanda CHADBURN, 2008, Silbury Hill: a last look inside. *Current Archaeology* 18(11)(215), 12 – 20.

THE NORTH BRITISH GOODS RAILWAY STATION VAULTS AND ARCHAEOLOGICAL EXCAVATIONS BELOW THEM, EDINBURGH

In the late 19th century the North British Railway built a goods station fronting New Street, close to Waverley Station, in Edinburgh, including extensive basement cellars for storage. These vaults, described as 'a major railway monument,' were last used in the 1960s and then sealed, and were surveyed and recorded in 2003 before they were demolished. The opportunity was taken to conduct an archaeological excavation below the site, which throws light on earlier phases of Edinburgh's development.

SOURCE: Ronan TOOLIS, Diana SPROAT, *et al.*, 2007, The transformation of an early post-medieval town into a major modern city: excavation and survey of the Waverley Vaults, New Street, Edinburgh. *Post-Medieval Archaeology* 41(1), 155 – 179.

FLINT MINES AT AND NEAR VALKENBURG, THE NETHERLANDS

An undated pamphlet recently published, the title of which might be translated as *Valkenburg flint: corner-stone of a culture*, features the remains of flint mines in the hillsides on the left (southern) flank of the valley of the river Geul, at Houthem St. Gerlach, Plenkert, Valkenburg, and Oud Valkenburg. Valkenburg, which also boasts several large underground limestone quarries (parts of some of which are open to the public as tourist attractions) and the remains of a castle, is a few stations east of Maastricht on the railway line to Heerlen.

SOURCE: Hub PISTERS, *et al.*, n.d., *Valkenburg vuursteen: hoeksteen van een cultuur*. NP: 8pp.

News - Conservation, Heritage & Tourism

NEWS – CONSERVATION AND HERITAGE

English Heritage's *Conservation Bulletin* 56 (Autumn 2007) focuses on the fact that, as John Schofield suggests in his editorial, 'Today's landscapes have the potential to become tomorrow's heritage.' The point has now long been recognised by English Heritage (and by their Scottish, Welsh, and Northern Ireland equivalents) that events in the last two to three centuries have moved so quickly that we now Schedule as Ancient Monuments structures created in our own lifetimes. Your reviewer, having taken his pupils in the 1960s to visit a then modern and fully operational industrial concern at Betchworth limeworks, has in retirement had the satisfaction of getting the now cold kilns Scheduled!

If the Roman, Danish, and Norman invasions (which did happen) were nationally important, so too were the

French, German, and perhaps Russian invasions (which didn't). Likewise the French and Russian revolutions, and our own Industrial revolution, all of which did. And now the Information Technology Revolution.

So, quite rightly, we are now Scheduling Ancient Monuments and Listing Buildings of Historical Importance erected in the course of the defence of Britain, and of making Britain a leading industrial nation (we invented the railways, remember!) The *Conservation Bulletin* includes a series of compilations of short and thought-provoking articles on where we go now, of which the following two may be of particular interest to members of Subterranea Britannica. Those of Davies, *et al.*, include John Schofield on 'Artists and airmen: documenting draw-down and closure of RAF Coltishall (Norfolk)' and Paul Francis on 'Hidden heritage: military Command & Control organisation bunkers of the Cold War.'

SOURCE: Philip DAVIES, *et al.*, 2007, Political landscapes – governing and defending the land. *English Heritage Conservation Bulletin* 56, 23 - 32.

SOURCE: John SCHOFIELD, 2007, Editorial: modern times. Today's landscapes have the potential to become tomorrow's heritage, but how do we know what matters and what to preserve? *English Heritage Conservation Bulletin* 56, page 2.

CHATTERLEY WHITFIELD COLLIERY BUILDINGS AT RISK, STOKE-ON-TRENT, STAFFORDSHIRE

Chatterley Whitfield colliery, Stoke-on-Trent, was for a time something of a tourist mecca, offering underground tours in real coal workings, reached by a real ride down a real shaft. Inclusive rail, bus shuttle, and entrance tickets were sold by British Rail over a large area, certainly including London. However, as adjoining mines went out of business and ceased pumping and ventilation, water and methane levels rose and the underground tours had to stop. For a few more years, visitors had to be content with an artificial set of mine galleries created in an earthed-over abandoned railway cutting. They had little access to the impressive range of surface buildings and plant, where vast sums of money would have had to be spent to bring them up to visitable standard. The surface structures now enjoy a measure of statutory protection as a Scheduled Ancient Monument; but still there is no money for their basic maintenance, never mind public access and interpretation.

English Heritage have now launched an appeal for finance for the care of 16 'critical heritage sites' all requiring expensive funding. Of these, Chatterley Whitfield, Cardington No. 1 Shed (Bedford), Ditherington flax mill (Shrewsbury), Soho foundry (West Midlands), Birnbeck Pier (Weston-super-Mare), Abbey Mills and Crossness pumping stations (London), Tynemouth Station (Tyne & Wear), and Wicker Arch and Viaduct (South Yorkshire) are of industrial archaeology interest.

The 16 'basket cases' are rated perhaps the most expensive of the 1,235 monuments on the *Buildings at Risk* register.

SOURCE: ENGLISH HERITAGE, 2007, EH's critical sites at risk. *Industrial Archaeology News* 143, page 14.

MANAGEMENT PLAN FOR 'AT RISK' DOVER WESTERN HEIGHTS FORTIFICATIONS, KENT

The Western Heights fortifications at Dover have been placed on the English Heritage list of monuments 'at risk' and thus in need of urgent intervention and conservation. It has been estimated that at least £1 million pounds is needed, for remedial work alone. English Heritage are owners of a part of the extensive site. A spokesman for the Western Heights Preservation Society has suggested that a conservation plan might be administered by the County Council.

SOURCE: ANON, 2007, Dover Western Heights. *Kent Archaeological Review* 170, page 224 [quoting from the *Dover Mercury*, 26 July 2007]

MINING WORLD HERITAGE SITE, NEAR CAMBORNE, CORNWALL

Over £22m lottery funding has been given to regenerate an historic area in the heart of the Cornish Mining World Heritage Site near Camborne. The plan includes a World Heritage Site gateway and parkland at Pool, including a performance space for events and artwork, educational facilities, and cycle links to local trails.

SOURCE: ANON, 2008, Heartlands Project for mining district. *Industrial Archaeology News* 144, page 15.

POSSESSION OF BATS – DEAD OR ALIVE

Subterranea Britannica's constitution requires members to give due consideration to all conservation codes of practice, whether relating to sites or structures, or to habitats and species they may harbour. And it goes without saying that all members are expected to stay within the law, specifically in our case the law relating to bats, as these may be encountered on the wing or hibernating underground. As all members should know, to disturb a bat (whether by body heat, noise, photography, smoking, or handling) is illegal other than by persons licensed by Natural England.

What may be less well known is that even the possession of a specimen of a dead European Protected Species, such as any of the species of bats inhabiting the British Isles, also requires a licence, unless the specimen was found before 10 June 1994. If you encounter live bats which appear to be hibernating, just move on quickly: on no account shine lights on them or attempt to photograph them. If you find a dead bat, contact Natural England's relevant regional office to see if a licensed bat specialist might wish to collect it for research purposes: on no account take it home as a souvenir.

SOURCE: NATURAL ENGLAND, 2008, Changes to the Habitats Regulations – possession, sale, etc., of specimens. *Entomologist's Gazette* 59(1), 69 – 70.

News - Defence & Military

REBUILT ELECTROMECHANICAL 'BOMBE' FOR DECODING GERMAN ENIGMA MESSAGES IN WORLD WAR II SWITCHED ON AT BLETCHLEY PARK

During World War II over 200 electromechanical decoding machines or 'bombes' were built and used at Bletchley Park, and also at Chicksands, Eastcote, and Stanmore, for decoding German ENIGMA messages. The first, Agnes, was operational in 1940. With as many as 10 such machines per room, these were operated by some 2,000 women (WRENs and Foreign Office staff) who outnumbered male personnel at Bletchley Park by three to one. One such machine has been reconstructed from plans surviving at GCHQ at Cheltenham, and was switched on on 17th July 2007 as a part of the British Computing Society's 50th anniversary celebrations. One of the successor devices, Colossus (using thermionic valves) was rebuilt in 1996.

SOURCE: Julia SWANN, 2007, Royal switch-on of bombe rebuild at Bletchley Park. *Links [Bull. Newcomen Society]* 204, 5 – 6.

ST. JOHN'S SCHOOL AIRRAID SHELTER AT REDHILL, SURREY

Relating to the occupation of pupils in school airraid shelters, *Board of Education Circular* 1535, issued on 18th December 1940, stated that 'time spent in shelters is not time wasted.' The teaching staff at St. John's School (for junior boys) at Redhill appear to have ensured that their 272 pupils, in rather cramped conditions in five parallel shelter tunnels, were kept busy. The walls are decorated with painted murals depicting scenes from *Beowulf*, *Gulliver's Travels*, *Pilgrim's Progress*, *Robin Hood*, *Robinson Crusoe*, and *Snow White*. These appear to have been painted during 1941, and were inspected by the School's Governors in April that year, filmed by Pathe on 7th July, and recorded by Fox Photos on 31st July. The surviving murals are also associated with some pencilled graffiti. Archaeological examination of the paints used, their modes of application, and other features (including splashes and dribbles) lead to speculation concerning the conduct of the children and their supervising adults.

This unusual survival is now being put to educational use again. The school has made a DVD of the murals, and hosts conducted shelter tours from neighbouring schools. More information is at the website www.stjohnsschoolredhill.co.uk.

SOURCE: Sue MORECROFT, 2008, Education and the school air raid shelter. *Industrial Archaeology News* 144, 5 – 6.

MEMORIAL SERVICE FOR THOSE KILLED IN THE BETHNAL GREEN TUBE STATION DISASTER OF MARCH 1943, LONDON

On 3rd March 1943 a panicking crowd rushing down the steps to take shelter in Bethnal Green Station resulted in Britain's biggest civilian loss of life during World War II. A memorial service for the dead was held on 2nd March 2008.

One or more persons on the lower part of the stairway evidently tripped and fell. Those behind tripped over and fell on those already fallen, ultimately leading to 173 deaths and over 90 injured, the victims being literally buried by other who had fallen on top of them. Those still at the entrance pushed and fought their way onto the flight of steps, unaware of the horror below. Sadly, the whole panic was the result of a false alarm.

SOURCE: ANON, 2008, Tube deaths remembered. *Metro*, 3 March 2008, page 29.

WW2 & COLD WAR BUNKER TO BE RESTORED AT NEWCASTLE-UPON-TYNE

RAF Blakelaw was a Second World War Royal Air Force Fighter Command station based at what is now Kenton Bar, Newcastle-upon-Tyne. Although the site has recently been redeveloped a huge underground bunker has been retained complete with a two-level operations room, mess and plant room. During WW2 the bunker was the 13 Group Fighter Command Headquarters and during the Cold War it was refitted as Region 1 Regional War Room.

A small number of enthusiasts have formed the 'RAF Blakelaw Preservation Group' with a two-fold purpose:

1. Restoring the bunker to its former glory and making it available to the general public as an historical and educational establishment.

2. Finding former RAF staff who served in the bunker and former members of 13 Group Fighter Command to collect and preserve their stories for posterity. Their website takes you on a tour of what is an eerie reminder of the days when this country was under threat of invasion: Visit their site at: www.bunker13.110mb.com or www.raflakelaw.co. see also the Sub Brit website www.subbrit.org.uk/rsg/sites/k/kenton_bar/

GOOSNARGH BUNKER TO BE TURNED INTO FIVE BEDROOMED HOME

A former World War Two bunker at Goosnargh is to be turned into an eco-friendly five bedroomed home - if planners give it the go-ahead.

Built for the RAF in the 1940s as part of the Langley Lane complex (known as Longley Lane), the Whittingham Lane bunker has deteriorated into little more than a dilapidated eyesore in recent years.

The owner has not only applied to Preston Council for the change of use of the now derelict bunker, but at the same time has submitted environmentally friendly plans showing how the property could be turned into a low-

energy home. Amongst his suggestions are solar panels, a wind turbine, rainwater collecting facilities, timber cladding, green grass roofing and pipes in the roof to let light in.

Most of the home would be at ground floor level and part of the home would remain underground.

The council voted unanimously in favour of the proposals with just one reservation coming from the Chairman who pointed out that wind turbines could be noisy.

The former bunker is part of one of four such bunker complexes built by the RAF in the 1940s, the others being at Inverness, Kenton Bar (Newcastle-upon-Tyne) and Watnall, Notts.

Each complex consisted of no less than three bunkers, typically a few hundred yards apart - one being the operations room, another the filter room and the third a communications centre.

The Whittingham Lane bunker, on the south side of the road, was the filter room, acting as a collecting point for information during the war. After the war the bunker continued to be utilised by the Ministry of Defence for a variety of uses until becoming empty in 1992.

It was then offered for sale by tender by the Ministry of Defence in June 2000 and prior to the sale there were two open days for potential buyers when temporary lighting had to be installed and the flooded lower level pumped out.

See Sub Brit web site:

www.subbrit.org.uk/rsg/sites/l/langley_lane/

Source: *Lancashire Evening Press* 15.3.2008

EASINGTON SCHOOL AIR RAID SHELTER TO BE RESTORED

Children from the Easington Primary School discovered what it was like for their wartime counterparts recently when they grabbed their gas masks and headed down to the nearest shelter to experience life during a mock air raid.

The school has four Second World War shelters in its grounds. Planning permission has been granted to demolish two of them to make way for a car park. One will remain intact and the other will be turned into an amphitheatre for wildlife studies.

During the recent exercise, the children re-enacted an attack and, as the air raid siren wailed, evacuated to the nearest shelter, with adults playing the parts of casualties, complete with fake blood and bandages.

Source: *Northern Echo* 19.12.2007

News - Mines & Quarries

BRITISH GYPSUM'S BIRKSHEAD GYPSUM MINE AND PLASTERBOARD WORKS AT KIRKBY THORE, CUMBRIA

Those members who joined the September 2007 Study Weekend and were lucky enough to be able to join the

Monday morning visit to the Birkshead gypsum mine will have been impressed by the very low profile of the mine's surface buildings. Little more than small single-storey offices and some discreetly hidden ventilation structures were visible. Most of the mine support facilities are underground. Where does the mined gypsum go?

The answer is that a conveyor system, presumably hidden behind hedgerows (we didn't see it), takes the material to the Kirkby Thore plasterboard works nearby, although I don't think we noticed that, either. To complete the environmental good news, much of the factory's output is sent to a depot at Elderslie (in Scotland) by train, to the tune of some five trains of 24 specially adapted waggons each week. Which explains why we saw so little heavy goods traffic on the neighbouring roads. In fact the scheme takes 1.7m lorry miles per annum off the roads, or 48 lorry journeys each day. Kirkby Thore has, since the 1990s, also used rail to bring in 'desulphogypsum' from Drax and other power stations to augment the freshly mined feedstock for the plant. Desulphogypsum is gypsum (calcium sulphate) created when lime is used to remove sulphur dioxide from fossil fuel-fired power station flue gases.

The underground visit was described in *Subterranea* 15 (December 2007), pages 23 – 26.

SOURCE: Tony MILES, 2007, Plasterboard from Cumbria to Scotland. *Modern Railways* 64(708), page 14.

ECTON COPPER MINES REOPENING FOR EDUCATIONAL VISITS, STAFFORDSHIRE

The copper mines at Ecton (Staffordshire), overlooking the Manifold Valley near Holme End, were in the 18th century amongst the deepest and, in the 1760s and 1780s, the most productive mines in Britain. Mineralised limestones and shales were worked at depths up to 300 metres below the local river level, although this part of the mine is of course now flooded. However, a depth of 100 metres of adits, shafts and stopes above river level is still accessible. The mine workings are a statutory Site of Special Scientific Interest, and the engine house and other surface remains are Scheduled as an Ancient Monument. There is evidence for Ecton being one (of only two known) English copper-mining sites dating from the Bronze Age. The site was open to visitors as a mining education centre under the management of the late Geoff Cox [1926 – 2003] and the mines and study centre are now, courtesy of his widow Elizabeth Cox, to be managed by the Ecton Mines Educational Trust.

SOURCE: John BARNATT and John BRAMLEY, 2008, Copper-bottomed. An old Peak District copper mine, reopened for tourists. *Geoscientist* 18(1), 4 – 5.

CLOSURE OF TOWER COLLIERY, SOUTH WALES

Coal reserves at Tower Colliery are now exhausted, and the mine has closed. The sixty miners are transferring to

a new colliery, and the present site will be redeveloped. The mine was closed under the premiership of Margaret Thatcher, but purchased and reopened in 1994 by miners using their redundancy money.

SOURCE: ANON, Tower Colliery, South Wales. *The Guardian*, 24 January 2008, 24 – 25.

SCOTTISH MINING MUSEUM, LADY VICTORIA COLLIERY, NEWTONGRANGE, MIDLOTHIAN

The Lady Victoria Colliery, housing the Scottish Mining Museum, has been voted amongst the 'ten most treasured places in Scotland' in a poll organised by the Royal Commission on the Ancient and Historical Monuments of Scotland. The colliery at Newtongrange in Midlothian was opened in the 1890s and became renowned as one of Scotland's first 'super-pits' producing around one million tons of coal per annum. It is now recognised as one of the finest late Victorian colliery sites in Europe, with well preserved buildings and artefacts. No access underground is now possible. The mine was named after the wife of the Marquis of Midlothian. It closed in 1991. The colliery is at Newtongrange, Midlothian, EH22 4QN, about nine miles south of Edinburgh, and open seven days a week between 10.00 and 17.00 – (T) 0131-663 7510 Website www.scottishminingmuseum.com

SOURCE: ANON, 2007, Lady Victoria Colliery tops the polls .. *Down to Earth* 61, page 4.

ALDERLEY EDGE COPPER MINES, CHESHIRE

An account of a recent visit to the copper mines at Alderley Edge has been published. The complex is of several mines excavated into Triassic sandstones which have been impregnated with solutions of copper salts from which have been deposited ore minerals within the sandstone. Malachite and azurite are prominent. There are also traces of non-copper minerals such as galena and pyromorphite (lead), haematite (iron) and others.

The route taken was via Wood Mine, the Hough Level drainage adit, and Brynlow and Engine Vein mines. Details of the mines, maps, surveys, and photographs can be found on the Derbyshire Caving Club's website at www.derbyshcc.org.uk/alderley/index.html

SOURCE: Andy Farrant, 2000, CSS go blue in Cheshire: Alderley Edge copper mines. *Newsl. Chelsea Speleological Soc.* 49(12), 117 – 118.

MINES AND QUARRIES IN THE FOREST OF DEAN, GLOUCESTERSHIRE

The Forest of Dean Local History Society, having erected a miners' memorial at New Fancy in 2005, now has £107,200 grant aid from the Aggregates Levy Sustainability Fund to construct a giant rock-mosaic geological map of the Forest nearby. The 900 square feet mosaic will be built using the correct local stone for

each outcrop shown on the map. The mosaic, which will be flat and polished (but 'not slippery' so it can be walked on), will have the more important mines and quarries indicated, former railway lines, and possibly some of the more important tramways. There will be stone-mounted explanatory plaques. The Forest had important underground coal and ironstone mines, and opencast and subterranean building-stone quarries. Completion is expected by March 2008.

SOURCE: Averil KEAR, 2007, 'Geomapping' the Forest of Dean. *Geology Today* 23(6), page 209.

THE ALSÓ-CSINGER COAL-MINING MUSEUM IN HUNGARY

Peter Burgess has recently described a visit to a colliery museum near the industrial town Ajka (25 kilometres northwest of Lake Balaton) in Hungary. Ajka is noted for aluminium smelting and a power station, with nearby bauxite and coal mines. Kaolin is also worked to supply a porcelain factory.

The Alsó-Csinger colliery, in a still rural setting, was one of four main mines which exploited a small, somewhat faulted, coal field worked from 1865 onwards. The mine features a timber-framed rectangular section 128m shaft, measuring 6m x 2.5m on plan. An underground fire here on 14th January 1909 resulted in 55 deaths. The mine closed in 1959, but all equipment was left in place, and the site reopened as a museum in 1965, featuring mining machinery, tools and rolling-stock. There is also a well-presented geological display.

SOURCE: Peter M. BURGESS, 2008, Alsó-Csinger – coal mining museum, Ajka, Hungary. *News of the Weald* 70, 5 – 6 [*News of the Weald* is the newsletter of the Wealden Cave and Mine Society]

GOLD MINING AND GOLD MINING POSSIBILITIES IN THE KLONDIKE, NORTHERN CANADA

The Klondike gold rush of 1896 followed the discovery of fragments of gold-bearing rock in river gravels near Dawson on the Yukon river. Even now there are about 400 miners working around 100 small mines near Dawson – using water to separate gold-bearing rock fragments from worthless gravel or sand. These operations are all carried out in opencast pits. Since 1896 it is estimated that more than 300 tonnes of gold have been extracted from about 100 million tonnes of waste rock.

Interestingly, the source-rock from which the gold-bearing fragments have been eroded has not yet been located. Somewhere in this inhospitable terrain there are presumably deep veins bearing native gold which could, if found, be mined (in cosier conditions than on the surface) deep underground.

SOURCE: Tony WALTHAM, 2007, Klondike gold. *Geology Today* 23(6), 219 – 226.

SEISMIC ACTIVITY KILLS A MINER IN THE WORLD'S LARGEST IRON-ORE MINE IN KIRUNA, SWEDEN

The city of Kiruna in the northern part of Sweden is tightly associated with the iron-ore mine; the latter has some 400 km of roads underground. The mine has grown so much underground that the ground surface has become unstable; the city centre with some 10,000 inhabitants will have to be moved within the next decade due to the unstable nature of the land.

If that had something to do with the slide that occurred 700 meters below the surface on 2nd February is uncertain. The official statement initially said that it was due to seismic activity from the post-glacial rebound in the area. The quake was measured as 2.2 on the Richter scale.

Although much of the work underground is remotely controlled, some workers are still employed underground. A 21-year-old miner got stuck in his truck when the tunnel collapsed and was killed. This is the second fatal accident in the otherwise very safe mine within one year.

Source: Lars Hansson

PLANS FOR A SCOTTISH GOLD MINE

An Australian company has announced plans to begin mining for gold near the Trossachs. Scotgold said it intended to fast-track plans to become the country's most significant gold producer after listing on the Australian Securities Exchange.

The company, which bought Cononish mine in Tyndrum in May last year, has raised millions of Australian dollars to begin operations. The site is known as a gold deposit but has never been commercially mined.

Scotgold bought the mine, 90 km north of Glasgow, and other exploration licences from Fynegold Exploration.

Their exploration rights cover 2,200 sq km of Central Scotland, making the firm eager to start operations on a number of gold prospects, including ready-to-drill targets along the Tyndrum Fault Zone in Glen Fyne.

Source: BBC News 24 15.1.2008 & www.mineweb.com

NEW USE FOR BILLINGHAM ANHYDRITE MINE

The anhydrite mines in Billingham have been opened for the first time in almost 30 years. Inspectors have explored the cavernous mines in a bid to assess whether they are in a suitable condition for use as a long-term disposal facility for low-hazard waste.

NPL Estates Limited is behind the plans to reopen the ICI-owned mine. Specialist mining engineers and scientists spent five days examining the mine on foot and taking samples of rock. A spokesman for ICI confirmed tests had been carried out and developers were awaiting the results. "The anhydrite mine inspection took place safely and as planned in early September," he said. "The mine has now been recapped. Specialist mining engineers and scientists spent five days

walking sections of the mine that had been subject to a previous detailed examination around 30 years ago. They also took rock samples for analysis."

A report on the inspection findings by specialist consultants co-ordinating the work was released in February 2008 and this is now being assessed.

The mines were worked from 1927 until 1971, and closed when the mine shaft was capped off in 1978. The mine measure 11 million cubic metres and runs under housing and commercial buildings below two thirds of Billingham and a local industrial estate.

Source: *Evening Gazette* 17.10.2007 & 9.2.2008

News - Tunnels & Tunnelling

LONDON'S NEWEST GHOST STATION, AND A NEW UNDERGROUND STATION

King's Cross Thameslink Station closed on 8th December 2007, Thameslink (now re-branded First Capital Connect) trains between Brighton and Bedford now calling instead at low-level platforms at the north end of the new St. Pancras International Station. St. Pancras International is served by the Eurostar through passenger services to and from Brussels and Paris; by Midland Mainline services to and from the east Midlands and south Yorkshire; and (using platforms below the main terminus) the 'Thameslink' services which cross London north-south via Blackfriars, City Thameslink, the Snow Hill Tunnel, and Farringdon. Eurostar services were relocated from Waterloo to St. Pancras on and from 14th November 2007.

The King's Cross Thameslink platforms are now out of use, but of course still visible from trains. The remainder of this station remains in use for access to London Underground trains.

The St. Pancras International low-level station has generously wide platforms, reminiscent of those on the Brussels Metro, and rather more adequate provision of seats than its predecessor. Escalators convey passengers up into the undercroft (where the beer barrels used to be) at the north end of the mainline station, where there are the Midland Mainline and Eurostar booking halls, and arcades of shops and cafes. From here, further escalators lead up to the mainline station train deck, a substantial part of which is open to the public, with further shops, bars, and the like. Thus the interior of Barlow's spectacular arched train shed, now repainted light blue, can be appreciated by the public at large, not just by Eurostar passengers. A nice touch, at the top of the escalator, is a sculpture of John Betjeman [1906–1984] as a result of whose efforts and influence St. Pancras was not, like the splendid nearby Euston, demolished.

EAST LONDON LINE (THAMES TUNNEL) CLOSED UNTIL 2010, LONDON

The Thames Tunnel, between Rotherhithe and Wapping stations on the East London Line, closed on 22 December 2007 for 2° years for refurbishment. When the line

reopens in 2010, with extensions to Crystal Palace and West Croydon (in the south) and Dalston Junction (in the north) it will form a part of the 'London Overground.' The tunnel was made between 1825 and 1843 by the Brunels, father and son, and is Listed Grade II*.

The original working shaft at Rotherhithe is to be leased to the Brunel Engine House Museum, and used for an extension of the displays. Here Marc Isambard Brunel [1769 – 1849] and his son Isambard Kingdom Brunel [1806 – 1859] constructed the world's first underwater tunnel. And there will be a 'shelf' from which visitors to the museum will be able to view the Brunels' original tunnel brickwork.

The Thames Tunnel was originally intended to be for road vehicles, but never used for this purpose as the necessary approach ramps on each bank of the Thames were never created. From its official opening it was used only by pedestrians, but in 1865 it was sold to the East London Railway, and incorporated into a new line from New Cross Gate to Wapping, opened in 1869. The line was later extended northwards towards Liverpool Street in 1876.

SOURCE: Robert CARR, 2008, Closure of East London Line. *Industrial Archaeology News* 144, page 14.

SOURCE: Jessica ROWSON, 2007, Brunel tunnel opened up. *New Civil Engineer*, 22 November 2007, page 9.

GO-AHEAD GIVEN FOR CROSSRAIL, LONDON

The £ 16 bn Crossrail project, a mainline loading gauge east-west railway line to pass in tunnels below central London, has been given the go-ahead. It is intended to convey main line trains between Maidenhead (Berkshire) and Shenfield (Essex) – in effect an east-west version of the existing north-south Thameslink services between Brighton and Bedford. Construction is expected to start in 2010, with the first trains running in 2017. Twenty-five of the 73 route miles will be in tunnel. Of the 38 stations to be served, there will be new ones at Canary Wharf, Farringdon, and Bond Street. Spurs are to be provided to serve London Heathrow Airport, and via the Isle of Dogs to Abbey Wood (north Kent.) There will be two parallel ten-mile tunnels between Paddington and Stratford.

SOURCE: ANON, 2007, Crossrail given go-ahead. *Greater London Industrial Archaeology Society Newsletter* 233, page 5 / www.crossrail.co.uk .

CROSSRAIL AND BUILDING DEVELOPMENTS ALONG THE TUNNEL ROUTES, LONDON

The planned commencement of tunnelling for London's Crossrail in 2010 is concentrating the minds of London property developers. From that time, there will be a 30-metre wide 'restricted zone' over the two seven-metre

diameter tunnels and an additional 3.5 metres either side of them. During tunnelling work, the construction of foundations for new buildings will be prohibited within this zone. Tall building projects at Canary Wharf and in the City of London would be particularly affected. There is, in consequence, a move to install piling at expected development sites before tunnelling commences. However, it is likely that many more piles than usual will be emplaced at each site, to allow the designers of new buildings as much scope as possible in the final designs and ground loadings.

SOURCE: Damian ARNOLD, 2008, Crossrail on piling ban. *New Civil Engineer*, 17 January 2008, 6-7.

PROPOSALS FOR A303 ROAD TUNNEL AT STONEHENGE SCRAPPED, WILTSHIRE

Proposals to re-route the A303 at Stonehenge, to allow the monument to be appreciated in the greater landscape of which it is a part, have included lengthy deviations away from the stones, a cut-and-cover tunnel, and a deep bored tunnel. Archaeologists have tended to favour the deviation, or the deep bored tunnel, as any cut-and-cover and surface works would inevitably prejudice the archaeological potential of the surrounding land.

It now appears that the tunnel option, perhaps of either kind, has been scrapped on grounds of cost.

SOURCE: ANON, 2008, Government buries Stonehenge tunnel plan. *Current Archaeology* 18(11)(215), page 5 [Proposals for A303 road tunnel scrapped]

PROPOSED GLASGOW SUBWAY EXTENSIONS, SCOTLAND

Glasgow's four mainline stations (Buchanan Street, Central, Queen Street, and St. Enoch) were reduced to two following the 1960s closures, with all services now concentrated at Central and Queen Street. At the same time, a number of lengths of line, tunnels, and viaducts went out of use. Fortunately, much of the infrastructure survives intact, and there are now plans to develop city-centre low-level east-west lines bringing some of this back to use, alongside the existing low-level lines through Queen Street and Charing Cross. The main proposal is for a new extension eastwards from Bridgeton, using existing but currently disused tunnels, surfacing near the east end of the Celtic Football Club's stadium. These plans appear to be independent of Glasgow's long-established circular subway line.

SOURCE: ANON, 2007, Glasgow studies 'Clockwork Orange' subway extensions. *Modern Railways* 64(711), page 11.

NEW RAILWAY TUNNEL ON THE BORDER – BELGIUM AND GERMANY

The main line from Brussels (Belgium) to Köln (Germany) carries much inter-city traffic, including sleeper trains, from the French and Belgian capitals to Berlin and



beyond. The border, between Liège and Aachen, is in hilly country and the line is now (since 14 November 2007) routed through the new 700m New Buschtunnel railway tunnel a little to the west of the German city, constructed in connection with Belgium's new east-west high speed line. The Old Buschtunnel will now be renovated over the next two years.

SOURCE: ANON, 2008. Aachen tunnel complete. *Modern Railways* 65(713), page 68.

UNDERGROUND CITY PROPOSED FOR AMSTERDAM, THE NETHERLANDS

There are proposals for a six-million-square-metre subterranean extension to the City of Amsterdam. A consortium of engineers and architects has submitted details for a network of tunnels below ground level, to accommodate car parks, cinemas, and sports halls. The surface streets, including the canalside roads, suffer from traffic congestion and parked vehicles. Sixty feet down, there is a bed of impermeable clay which it is proposed to reach by temporarily draining the canals, building cut-and-cover spaces, and then re-instating the canals on top of a waterproof ceiling. The subterranean spaces thus created could be on up to six floors. A subterranean 'park-and-ride' system is also in contemplation. It is suggested that the voids might be made more user-friendly by projecting images of the sky and clouds onto the ceilings. Ambient temperature would be maintained at around 18°C using recirculated canal water as a coolant.

The report refers to Toronto, Canada, where since the 1970s more than 30 kilometres of tunnels containing shops have been built below the surface.

SOURCE: Robert BOOTH, 2008, Amsterdam looks underground to ease congestion. *The Guardian*, 21 February 2008, page 23.

FURTHER EXTENSIONS FOR THE COPENHAGEN MINI-METRO, DENMARK

Copenhagen's Mini-Metro has recently been extended to the airport. Further extension is now being planned, taking the form of a 16 km ring line in tunnel with 17 sub-surface stations and a depot.

SOURCE: ANON, 2007, Ring line for the Copenhagen Metro. *Modern Railways* 64(711), page 66.

ELEVEN KILOMETRES OF NEW ROAD TUNNELS FOR STOCKHOLM, SWEDEN

Stockholm's northern bypass, the Northern Link, is to include 11 km of tunnels, mostly to be made by drilling and blasting through the granite bedrock. Part will be concrete-lined and driven through earth below the city's national park, where conservation concerns rule out a cut-and-cover approach and the surface is to be left undisturbed. Construction started in September 2007, and is expected to be completed by 2015.

SOURCE: ANON, 2007, Down 'n' dirty in Stockholm. *New Civil Engineer*, 22 November 2007, page 11.

SCRAPPING OF PROPOSED SUB-SURFACE PORTAL ALPINA STATION ON THE NEW GOTTHARD BASE TUNNEL, SWITZERLAND

The new Gotthard base tunnel on the line from Switzerland to Italy will not after all have a deep-level station within its length, with a deep lift shaft connecting with surface buildings on the mountain above. The cost of some excavation work for the platforms and adjoining spaces at what would have been Porta Alpina Station at the bottom of the shaft is being written-off. Another underground curiosity – a deep-level mainline station, never completed, in the heart of a mountain.

SOURCE: ANON, 2007, No tunnel station on the Gotthard. *Modern Railways* 64(711), page 69.

THE WORLD'S LONGEST TUNNEL?

Associated Press reported on 13 June 2007 that 'heavy snow in the Andes resulted in the closure of the Cristo Redentor tunnel on the border between Argentina and China earlier this week.' Thousands of trucks were stuck both sides of the road tunnel, which was closed for some 72 hours.

In fact of course the Cristo Redentor road tunnel (a mere 1.9 miles long), at 10,400 feet up in the Andes, is on the Argentine border with Chile. A splendid example of the folly of relying on a spell-checker?

FROM: *Geoscientist* 17(11), page 5 (2007.)

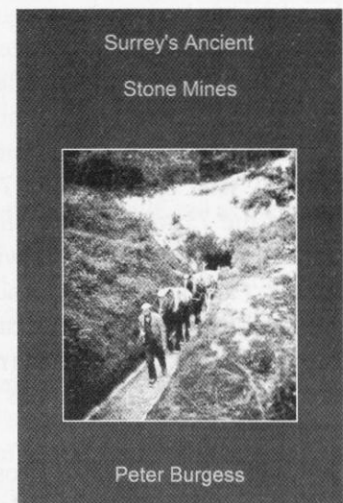
News - Publications - Books

REVIEW: SURREY'S ANCIENT STONE MINES

Review of P.M. Burgess, 2008, *Surrey's Ancient Stone Mines*.

Forty or so years ago, there had been little, and uncoordinated, research into the numerous underground mineral workings in east Surrey. These include mines and underground building-stone quarries in the Upper and Lower Greensand, and in the Chalk. Peter Burgess's latest and most welcome book, the result of over 40 years of research by himself and others,

addresses the archaeology and history of the underground quarries and the hearthstone mines in the Upper Greensand, as well as the secondary uses to which some of them have been put. These are amongst the oldest and most extensive underground building-stone quarries in the British Isles, and have been recognised by English



Heritage, in part, as eminently worthy of Scheduling as Ancient Monuments.

The book is an invaluable milestone and summary of progress to date on what might for convenience be called the Reigate Stone Research Project, adding very materially to an earlier attempt in 1976.

There are over a dozen maps and plans, mostly location maps but including small-scale reproductions of plans of four of the smaller mines and quarries, viz. Cawley's and the Surrey Hearthstone Mining Company's (and later the Dorking Greystone Lime Company's) hearthstone mines at Betchworth; the Reigate Mines Ltd's hearthstone mine at Colley Hill, Reigate; and Baldwin's mine or quarry (or both) at Godstone.

Twenty or so photographs illustrate surface and underground archaeological features, and there are over 30 drawings or photographs of artefacts and graffiti. Also a number of contemporary surface photographs of the then still working mine or quarry yards or works at Godstone and Reigate. Only a handful of photographs shew the building-stone *in situ* in standing buildings, from Roman and Saxon through to the Victorian era. There is a useful but brief summary of the shortcomings of the material as a building-stone, as exemplified by the 1870 fabric of Reigate Grammar School.

Eight pages are devoted to information relating to people, mostly from the 19th and 20th centuries, associated with the industry. Employment statistics from the Reports of HM Inspectors of Mines for the period 1893 – 1950 are given, for each of the four parishes (Brockham, Betchworth, Reigate, and Godstone) having active mines in the modern period. A two-page glossary of technical terms is followed by a comprehensive index in six pages.

Each chapter is followed by references to archival and printed primary sources, totalling 115 altogether.

Particularly welcome new observations and interpretations include work towards relative dating of different parts of the Merstham-Chaldon network, work on ox- and horse-shoes found underground, and the recognition from tool-marks of places where vertical slabs of stone, perhaps for refractory purposes, have been taken from the quarry walls.

DETAILS: Peter M. BURGESS, 2008, *Surrey's Ancient Stone Mines*. Crawley: author: 204pp [ISBN 978-0-9556081-1-7]

[This highly recommended book is available at £14.20 inclusive of postage and packing from the author: Peter Burgess, 8 Trotton Close, Maidenbower, CRAWLEY, West Sussex RH10 7JP (Wealdenpete@aol.com)]

CHELTENHAM STONE: THE WHITTINGTON UNDERGROUND BUILDING-STONE QUARRIES, GLOUCESTERSHIRE

There are scattered underground building-stone quarries in Jurassic limestone beds in the Cotswold Hills of

Gloucestershire and Oxfordshire, east of and serving the ancient and historic city of Gloucester and the newer Cheltenham. They lie to the north of the generally more numerous and often more extensive and better-known underground Bath stone quarries to the south, southeast and east of Bath.

It has long been supposed that most of the stone for Cheltenham's Regency and Victorian buildings came largely from opencast quarries at Leckhampton, about 3.5 km to the south. It is now demonstrated that much of it was in fact quarried underground at Whittington, about 6.5 km to the east. Arthur Price, who farms at Frocester Court and has been researching the archaeology and history of the underground quarries and of structures built with the stone from them for nearly 30 years, has now published an exceptionally well-produced book in which the evidence for his conclusion is presented.

The focus is on the Dodwell Hill and Syreford underground quarries at Whittington. The archaeological evidence yielded by these sets of tunnels is described in detail, with some 30 photographs of quarry interiors and entrances, over 15 maps and quarry plans, and 30 or so drawings and photographs of artefacts and graffiti found underground. Historical data from both archival and published sources (meticulously referenced) supports the account.

The destination of all the stone removed is equally carefully documented, and there are photographs and historic prints of buildings erected with it, and reproductions of associated documentation.

Each chapter has a full list of sources, and there is an impressive index filling eight pages. Fifteen or so of the illustrations are colour photographs.

This is an exceptionally important book, and is strongly recommended to all having an interest in the architecture of the region, and in extractive industry generally.

DETAILS: Arthur J. Price, 2007, *Cheltenham stone: the Whittington quarries*. Cotteswold Naturalists' Field Club: ii + 167pp [ISBN 1-904530-08-7] [SEE: <http://uk.geocities.com/cottsnats/> / Email: cottsnats@yahoo.co.uk]

TOTTERNHOE UNDERGROUND BUILDING-STONE QUARRIES, BEDFORDSHIRE

Hard varieties of chalk have been quarried underground for use as building-stone at several places in England, including Beer (Devon), Guildford and Mickleham (Surrey), and Totternhoe (Bedfordshire.) These quarries are historically very significant places, with a long history. Beer, for example, supplied much stone for Exeter Cathedral. Guildford's 'white stone' was used by Wren in the new St. Paul's Cathedral.

Totternhoe stone appears to have been used to a small extent in a 3rd or 4th century Roman villa nearby, and there is documentary evidence for it being quarried from



1131/2. The quarries, all variously sealed or opencasted out of existence, were tunnelled into the Lower Chalk of the Chiltern Hills escarpment some two miles west of Dunstable.

Joan Curran's most welcome book on this industry devotes its first chapter (16 pages) to the quarries, and is illustrated by maps and plans, sections, and photographs giving a good impression of the nature, extent, and appearance of the underground galleries and the surface topography. A western set of tunnels has probably been largely quarried away, firstly by the removal of grey chalk overburden taken as feedstock for a former limeworks dating from 1869 onwards, and secondly by working the Totternhoe stone opencast (some is still worked for architectural repairs.) Two further sets of quarry tunnels to the east had, between them, at least four adit entrances, all of which are now sealed. All the then accessible tunnels were surveyed in 1957–58, and the results of that work are reproduced at a small scale in the book.

The remainder of the book is primarily, and very properly, devoted to the architectural use of the stone in buildings, equally well illustrated.

This is a well-researched book, based on a range of published and archival sources, details of all of which are provided,

DETAILS: Joan CURRAN, 2005, *The story of Totternhoe quarries*. Dunstable: Church End Publishing: vi + 78pp [Available at £8.20 incl. p/p from Church End Publishing, Beaumont, Church End, Edlesborough, DUNSTABLE, Bedfordshire LU6 2EP]

FOXENDEN QUARRY WORLD WAR II DEEP AIR RAID SHELTER, GUILDFORD, SURREY

Helen Davies, a local historian in Guildford, has recently published a booklet about the deep air raid shelter tunnelled into the face of an old chalk pit in York Road in Guildford. The tunnels, intended to accommodate 1,000 people, were excavated below the Allen House Grounds in 1941. The entrances are today within the York Road car park. The booklet includes a plan of the shelter tunnels, and 19 photographs of the interior showing features such as timbering, signs painted on the walls, water supply and sanitation fittings, a ventilation and emergency escape shaft, and so forth.

There will be a special open day at the shelter on Saturday, 17 May 2008, from 10.00 onwards, with tours by ticket only; and again on Friday 12th and Saturday 13th September, also by ticket only.

The booklet is available from the author at £3.50 inclusive of postage and packing, at 6 Omer Road, GUILDFORD, Surrey GU1 2DB.

DETAILS: Helen Chapman DAVIES, 2007, *The Foxenden Quarry deep shelter: Guildford's purpose-built World War Two public air raid shelter*.

Guildford: Helen Chapman Davies: iv + 19pp [ISBN 0-9543753-3-5]

V2 BALLISTIC MISSILES AND SITES

Having been missed (just) by a V2 rocket on 29th December 1944, your reviewer always finds information on the German supersonic weapons of more than passing interest. This attractively illustrated booklet discusses the design, development, production and use of the rockets, and their status as the fore-runners of the Cold War era intercontinental ballistic missiles. Of underground interest are the sections dealing with the Mittelwerk factory tunnels near Nordhausen (eastern Germany), and concrete missile bunkers at Sottevast, Watten, and Wizernes (France.)

DETAILS: Steven J. ZALOGA, 2003, *V-2 ballistic missile 1942–52*. Oxford: Osprey Publishing: 48pp [ISBN 978-1-84176-541-9] [On sale at £9.50 at the Imperial War Museum bookshop]

HITLER'S HEADQUARTERS

This well-illustrated book is concerned as much with Hitler's use of surface buildings as subterranean structures, and is relatively light on details and photographs of his purpose-made underground bunkers. However, it does usefully place a number of these in wider context. For example, the Berghof cottage near Berchtesgaden, rented from 1925 and purchased in 1933 (from the royalty income from sales of *Mein Kampf*) was developed in time with a 407 ft. tunnel into the mountain and a lift shaft up to the Kehlsteinhaus. Other underground sites described include the Felsenest near Münstereifel (50 miles SW of Köln) and Zossen-Wünsdorf built (but not used by Hitler) 15 miles south of Berlin, and of course the Führerbunker at the Reich Chancellery in Berlin, where the dictator committed suicide shortly before Germany capitulated in 1945. There is information, too, on Hitler's train and yacht.

DETAILS: Blaine TAYLOR [1946 - ???], 2007, *Hitler's headquarters: from beer hall to bunker, 1920–1945*. Washington DC: Potomac Books Inc.: xii + 209pp [ISBN 978-1-57488-928-4] [On sale at £19.95 at the Imperial War Museum bookshop]

GUIDE TO THE INDUSTRIAL ARCHAEOLOGY OF LANCASHIRE

The Association for Industrial Archaeology's latest *Guide*, published for its 2007 Annual Conference, covers modern Lancashire, including the areas of Blackburn, Blackpool, Burnley, Lancaster, Preston, and Southport. Very few underground sites are featured. Two tunnels on the Leeds & Liverpool Canal are noticed, at Gannow (510 metres) and Foulridge (1500 metres.) The latter, made in 1792–96, suffered collapses in 1824 and 1843, but remains in use. The third tunnel listed (Gisburn, 152 metres), opened for the Lancashire & Yorkshire Railway in 1880, is 'not really a tunnel' but a covered way under Gisburn Park with castellated stone portals.

Coal-mining barely features, although there is mention of a lead mine at Anglezarke (SD 625185) with shafts, spoil heaps, and drainage soughs near Chorley. Other extractive industrial sites noted include for brick and tile works, and four limekiln sites.

DETAILS: Michael NEVELL and David GEORGE, 2007, *A guide to the industrial archaeology of Lancashire*. Association for Industrial Archaeology: 56pp [ISBN 978-0-9528930-9-7] For availability contact the AIA Liaison Officer, AIA Office, c/o School of Archaeological Studies, University of Leicester, LEICESTER LE1 7RH.

THE FAUSTBALL TUNNEL WWII PoW ESCAPE TUNNEL, PAPAGO PARK, ARIZONA, USA

On 23rd December 1944 25 German prisoners-of-war (including a U-boat commander and crew) escaped through a 178 ft. tunnel they had dug from inside Compound 1A at Papago Park, Arizona. The idea had been to escape overland (crossing a desert landscape) to Mexico, but all were recaptured within six weeks.

Faustball (English fistball) is a form of volleyball of Italian origin introduced into Germany in the 1890s. The entrance to the tunnel and the tunnel spoil were disguised by the prisoners' carefully tended gardens and faustball field.

The book reviews earlier such tunnels, including one made by escaping Union officers from the Libby Prison at Richmond in 1864, and another made by World War I German prisoners-of-war at Fort McPherson, Atlanta, when ten men escaped on 23rd October 1917.

DETAILS: John Hammond MOORE [1924 - ???], 2006, *The Faustball Tunnel: German POWs and their Great Escape*. Annapolis: Bluejacket Books / Naval Institute Press: xvii + 271pp [ISBN 1-59114-525-0] [On sale at £11.99 at the Imperial War Museum bookshop]

THE CASSINI HISTORICAL MAPS SERIES

An important new series of maps is likely to prove a most useful aid to historical research of all kinds, especially of industrial and transport features of the 19th / 20th centuries. A 'map regression exercise' is a fancy term for studying the history of a particular site by tracing it back from a modern map through progressively earlier ones. Whilst apparently a simple enough thing, there are often difficulties resulting from the maps used having different scales, different sheet lines, and having been drawn on different projections.

The Cassini Historical Maps series reprints the earliest one-inch Ordnance Survey sheets, and later ones, all reduced to the 1:50,000 scale used for the modern Landranger series, reprojected from the older Cassini to the modern Transverse Mercator system, and with

sheetlines exactly corresponding with the modern Landranger sheets. Details have been digitally enhanced; colour (if used) has been faithfully reproduced; crease marks and stains (on older maps) have been removed; and yellowing of the older sheets allowed for. As with the modern Landranger series, the entire country is covered in 123 sheets.

Details for a sample set of three historical maps (the current Landranger sheet making a fourth) for sheet 187, which includes much of south London and eastern Surrey, are as follows. The sheets, folded in covers in the same style as their modern equivalents, are £6.99 each.

ORDNANCE SURVEY, 2007, *Cassini historical map: Old Series 1813 – 1819 Dorking & Reigate. Matching Ordnance Survey Landrover 187*. Ordnance Survey: paper map folded in cover [ISBN 978-1-84736-062-5] [Black-and-white as in the originals]

News - Publications - Periodicals

FORTRESS STUDY GROUP – FORT 34

Volume 34 of the Fortress Study Group's journal *Fort* (that issued for 2006) was received in November 2007. This issue of 176 pages includes 48 pages of colour photographs, and more such on the front and back covers. Its contents are as follows:

BLACKWOOD, Charles. Review of Vauban under siege: engineering efficiency and martial vigor in the war of the Spanish succession.

BONAVITA, Roger Vella. The opinion of Gian Giacomo Leonardi Count of Montelabbate on the design of the fortress that the Knights of St. John of Jerusalem proposed to build in Malta, 31 October 1557.

CARVELL, Steve. The Oxford Canal Stop Line: an illustrated survey. A World War II anti-invasion line of pill-boxes and tank obstacles.

CLEMENTS, Bill. Nineteenth- and twentieth-century artillery fortifications in Burma.

LOWRY, Bernard. Review of Beaches, fields, streets, and hills: the anti-invasion landscapes of England, 1940.

OLSEN, Svein Wiiger, and Terry GANDER. The Austrätt Battery, Trondheimsfjord, Norway. The Norwegian part of the German 'Atlantic Wall' in World War II.

REISS, Günther D. The Fortified Front Oder-Warthe-Bogen near the pre-1939 German eastern border. A World War II fortification system on the former Germany/Poland border, including details of an extensive tunnel system.

SAUNDERS, Andrew. Sárospatak Castle, Hungary. A 16th – 17th century fortress, palace at the fortified town Sárospatak on the west bank of the rivér Bodrog.

SEGULJEV, Nenad, Aleksandar PAVLOVIC, and Phillip WATTLES. Patrovaradin fortress – A fort built in 1692 – 1728 and added to in 1754 – 1780, 80 kilometres northwest of Belgrade.



TOMLINSON, Richard. Three centuries of fortifications in South Africa 1652 to 1958. Dutch and British fortifications and signal towers in and around Cape Town and elsewhere, up to and including those of World Wars I and II

NORTHERN MINE RESEARCH SOCIETY: BRITISH MINING 83

The Northern Mine Research Society's *Memoirs* for 2007 (*British Mining* 83) were published in December in that year. This issue contains the following papers:

BARNATT, John, and Terry WORTHINGTON. Post-medieval firesetting in British metal mines.

BENNETT, John, and Jeremy WILKINSON. Gold in the Mawddach.

CALLENDER, R.H., 2007. Exhibition design: a plain man's guide.

FAIRBAIRN, Raymond A. A tenth-century lead smelting site in West Allendale.

GILL, Michael. Towards a chronology for Britain's coal industry from 1854 onwards.

GOODCHILD, John. Expanding markets served by the principal West Riding coalfield before c. 1850.

JOB, Barry. Colliery intrushes and the disaster at the Moorcroft colliery, Bradley, August 1813.

MILLS, Alan., An investigation into the legend of a mining disaster in Arkengarthdale.

RANKINE, Alexander G. Mining in mid-Argyll.

News - Miscellaneous

RICK GIBSON

Rick Gibson, a former member of the Greater London Industrial Archaeology Society and of Subterranea Britannica died in 2007, as a result of mesothelioma, a lung cancer contracted from exposure to asbestos when he worked at the former Post Office Research Station at Dollis Hill. He, and his former wife June who survives him, was a familiar figure at Association for Industrial Archaeology and Subterranea Britannica events a few years ago.

SOURCE: Bob CARR, 2007, Obituary. Rick Gibson. *Greater London Industrial Archaeology Society Newsletter* 233, page 11.

THE OXFORD DICTIONARY OF NATIONAL BIOGRAPHY ONLINE

The new (*Oxford*) *Dictionary of National Biography* was published in book form (a shelf-full of bound volumes) in 2004 and, of course, immediately went out of date! Its online version is however continuously updated: there have been nine electronic updates since 2004 with over 1,300 new biographies added, making currently a total of over 56,000 persons for whom there are entries.

This is available free at most British public libraries, and for many local authorities can also be accessed at home using your public library card number as password. It is easy to search for particular personal names, place-names, or topics. Searching for mines or mining, tunnels or tunnelling, for example, will throw up lists of all biographies in which these topics are mentioned. And you can print articles as required. In view of the continuous updating, it would be as well to search for information on your persons or topics of interest from time to time, not just once! The website address is www.oxforddnb.com

The original DNB was started in 1882 by George Smith [1824 – 1901] and (by 1930) published in 63 volumes and a number of supplementary volumes for entries made after 1900. All of the 'Old' DNB entries, generally revised in the light of later scholarship, are included in the 'New' Oxford DNB.

SOURCE: Mark CURTHOYS, 2007, The Oxford DNB three years on. *Local History News* 85, 9 – 10.

ON THE UNIMPORTANCE OF BEING RIGHT

'On the unimportance of being right' was the title of a splendidly intelligent talk on the late-lamented Third Programme (now dumbed-down as 'Radio Three'). This notwithstanding, we still have the popular press (including, sadly, the equally dumbed-down 'quality' dailies) and spin!

A recent example has been spotted by the Geological Society of London, the world's oldest and arguably premier society of professional geologists (which still welcomes amateurs as fellows) which was founded in 1807 as a dining club at Freemason's Tavern in Great Queen Street. A plaque erected at a quite different pub, the Freemasons Arms in Long Acre, without reference to the Society, claims the latter pub to have been the Society's birthplace.

It goes on to record as principal founder members 'William Buckland - fossil theorist', 'Peter-Paul Roget - [of the] Thesaurus', 'Sir Humphrey Davey - Miners' Lamp' and Charles Barry – Architect.'

In fact, as the Society points out, Sir Humphrey Davy (who was a founder member) didn't spell his name as rendered; and neither Peter Mark (not Peter-Paul) Roget nor William Buckland were founder members. Regrettably, the Geological Society describes Charles Barry [1795 – 1860] as 'the architect of Burlington House' (its present home in Piccadilly) and fails to mention that he, being aged 12 years in 1807, was unlikely to have been a member of a dining club! In fact the original Burlington House was designed in 1664 – 65 by one Sir John Denham; the additions at the front built in 1868 – 73 housing the Geological



Society (amongst other learned societies) were designed by the architects R.R. Banks and Edward Middleton Barry [1830 – 1880], Sir Charles' son.

This fine mess presumably originates from garbled information from a website, the Society observes! Many of the inaccuracies could have been avoided by reference to a more reliable website, such as the online *Oxford Dictionary of National Biography!* And careful reading of the Society's own website, www.geolsoc.org.uk

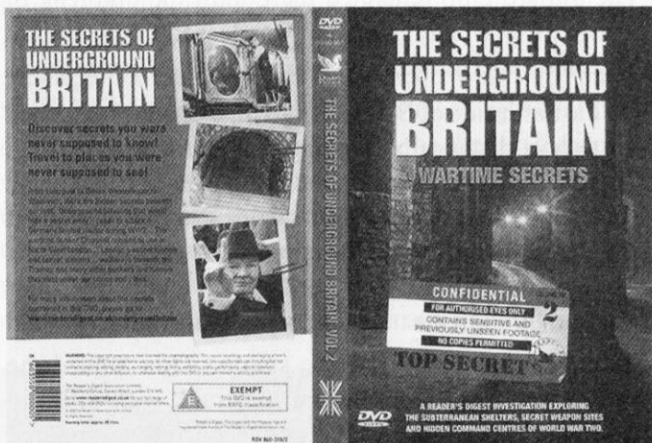
An accurate commemorative plaque is to be unveiled by the Society's President at the Connaught, which occupies the site of the demolished Freemasons Tavern.

FROM: *Geoscientist* 17(11), page 5 (2007.)

The Secrets of Underground Britain DVD review by Andrew Smith

This is a new release of three DVDs from the usually staid Readers Digest and marks what is believed to be the first time they have produced a series of DVDs focusing solely on subterranean Britain.

Readers Digest has a reputation for being at the quality end of the market when it comes to production



standards in their magazines and other video offerings. These three DVDs remain true to that reputation, with high standards of production overall, despite one or two areas of dodgy camera work.

The content of each DVD follows a theme, with the first disk focusing on the 'Hidden History' of subterranean Britain. This disk covers sites such as Royston Cave, the Victorian sewers in Brighton, Williamson's Tunnels in Liverpool and mines in Cornwall and Wiltshire. It also features Nick Catford and Nick McCamley from Sub Brit – both in their element, giving lucid accounts of some of the underground sites. The detail on each sites varies; some, such as Royston Cave, are given just a cursory overview, whilst the underground 'Ballroom' at Witley

Park near Godalming receives a much more in-depth overview. This disk covers a time period up to roughly the Victorian era.

The second DVD opens with an in-depth look at some of the abandoned and disused London Underground stations, followed by a good look at the now defunct Mail Rail – the subterranean railway owned by the Royal Mail.

The DVD goes on to cover the Glasgow underground, the Cabinet War Rooms, Paddock, Manod et al. This is by far the best of the three DVDs as it has a much wider coverage of sites and there is an excellent section on the Auxiliary Units of WW2. Again, McCamley and Catford feature heavily along with a few other site experts.

The third and final disk covers the 'modern mysteries' and is more or less totally focused on the Cold War period. Opening with an extensive and very detailed section on the Royal Observer Corps, there is a visit to the ROC post museum at Veryan in Cornwall. Kelvedon Hatch and Anstruther get a positive review, as does Pear Tree House and the former Southern Water bunker at Brede.

The main section of this third DVD is given over to an in-depth look at the former Government war HQ deep under Corsham in Wiltshire. There is also a brief look at the Millennium Seed Bank Vault and the anchorage chambers of the Tamar Bridge. And yes, the 'two Nicks' appear in this DVD as well!

Overall the three DVDs are generally well produced but you can't help wondering if the information on some of the sites could have been a little more comprehensive and there are also some notable absences from the list of sites covered. In general, apart from a few niggly faults, this is a set of DVDs worth adding to your collection for all but the most serious of Subterranean explorers.

Presenter Chris Langmore.

Secrets of Underground Britain is not available in shops and can only be bought directly from Readers Digest through their website. Cost is £39.99.

www.readersdigest.co.uk/secrets-underground-britain-p-721.html

Blackheath Hill Railway Tunnel

By Nick Catford

The original plans for the Greenwich Park branch of the London Chatham & Dover Railway (LCDR) proposed a line from Nunhead through Greenwich terminating at the Royal Dockyard in Woolwich. However, with the opening of the South Eastern Railways (SER) extension from Greenwich to Woolwich in 1849 there was no longer a need for the Greenwich Branch extension to Woolwich and the LCDR were eventually authorised to build a 2 mile 18 chain line between Nunhead and Crooms Hill, on the western side of Greenwich Park, by an Act of Parliament in July 1863.

Financial problems delayed construction until 1871. The branch opened as far as Blackheath Hill on 18th September that year with one intermediate station at Lewisham Road; a second at Brockley Lane was opened in June 1872. Despite disappointing receipts, the LCDR continued with their proposal to extend to Greenwich but financial difficulties meant the extension wasn't completed to Greenwich Park (Greenwich until 1900) until 1st October 1888.

The extension failed to attract additional traffic to the line which was unable to compete with SER's direct line from Greenwich into central London. A push-pull service was introduced in 1913 in an attempt to cut losses, but the Greenwich Park branch closed on 1st January 1917 as a wartime economy measure and never reopened. The station was, however, occasionally used after that date for the public to travel to Blackheath for events on the Heath.

In 1927 the Southern Railway refurbished the section of line between Nunhead and Lewisham Road with a new spur being built down to the Mid Kent line between St. Johns and Lewisham; the remaining severed section of the branch between Lewisham Road and Greenwich Park was formally abandoned by Act of Parliament in 1929.

Blackheath Hill Station was sited in a deep cutting on the south side of Blackheath Hill and after leaving the station for Greenwich, trains immediately entered a short brick-lined tunnel under the A2 (Blackheath Hill) which was 55 yards in length.

The brick and timber street-level building of Blackheath Hill station had a covered footbridge giving access to the platforms in the cutting below. After closure, the station building was used by the 'Services Remembered Club' from 1921 and from 1929 it housed the 'MacCormack Billiard Club' which became the 'Blackheath Billiard Club' in 1931. It seems unlikely that the club would have used the tunnel.

The billiard club remained there until the outbreak of war in 1939 when the station was leased to the Helliot Machine Tool Company who were involved in war work.

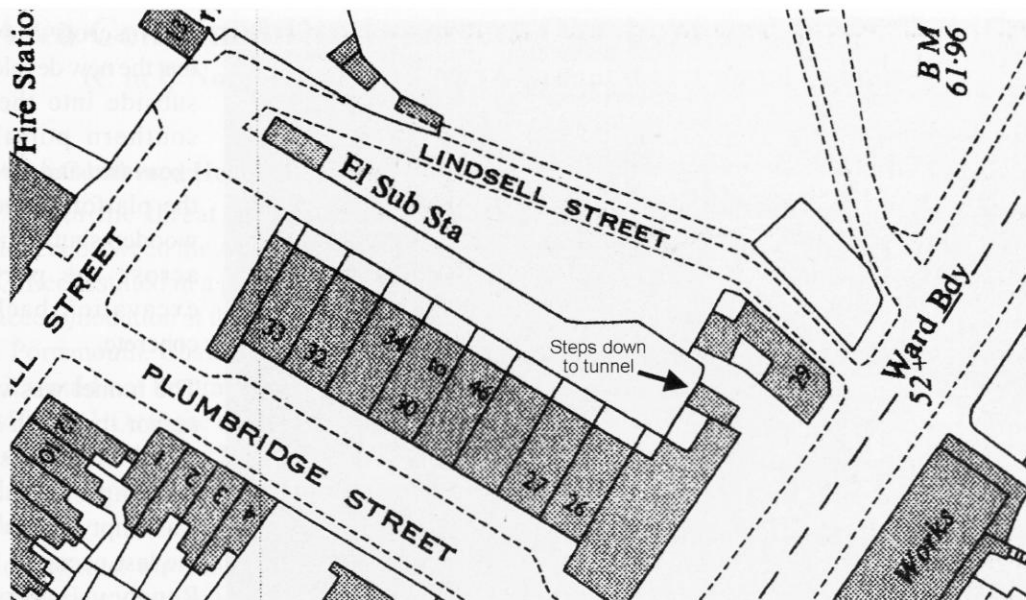
On the north side of Blackheath Hill, the tunnel extended for a short distance before opening into a deep cutting. There were retail shops on the north side of Blackheath Hill, with houses on the east side of Plumbridge Street which runs parallel with the railway line on its west side. At some time after closure of the line, a concrete floor was laid through the tunnel forming a large underground

work space. This was done before the track was lifted in 1929 as the concrete was poured over the track and sleepers. It is unclear what this underground area was initially used for, but the 1927 Kelly's directory lists a company called Express Cable & Engineering in Plumbridge Street. This was the only business shown so it seems likely that they might have occupied the tunnel from this date. By the mid-1930s there was a builders yard on the course of the railway line on the north side of Blackheath Hill and this company used the tunnel to store breeze blocks.

On 17th June 1940 the tunnel was leased to Greenwich council



Blackheath Hill station and tunnel in 1920s.



by the Southern Railway for use as an air raid shelter. This conversion was approved by the Ministry of Home Security on 11th July 1940 and the total cost of the conversion was £394 plus £80 for temporary works. It was known as the Blackheath Hill Shelter, with access from Lindsell Street and Sparta Street plus a set of steep steps down from Blackheath Hill to the Lindsell Street entrance. The main entrance to the shelter was from Sparta Street from where there was a short walk along the infilled cutting and down a gentle slope into the shelter (the slope was later replaced by a series of wide steps). Chemical toilet cubicles were sited at the entrance and just inside the tunnel there was a small canteen, kitchen and first aid post. The internal walls were whitewashed. A second set of chemical toilets was later proposed for the Lindsell

Street entrance but these were considered unnecessary as those at the Sparta Street entrance were considered adequate. The shelter was always damp and was fitted with an electric heater in January 1943. By this time the shelter was usually referred to as the Sparta Street Shelter.

The tunnel was divided into two large rooms, the room on the north side of Blackheath Hill being slightly longer than that on the south side; it was necessary to go through one room to reach the other. Each room had triple bunks around the walls with another line of bunks across the centre of the room; the bunks were separated by curtains for privacy. Many local residents spent every night in the shelter during the blitz, often arriving there during the afternoon. They were given regular numbered bunks and were allowed to keep personal belongings in the shelter.

There was no segregation between male and female and families were kept together. The shelter was returned to the Southern Railway on 25th December 1946.

By 1949 the houses on the east side of Plumbridge Street and the shops along Blackheath Hill had been demolished and replaced by a four-storey block of flats above shops in Plumbridge Street. This building extended along Blackheath Hill as a two storey block with a single-storey extension at its east end accessed from the service road at the back of the shops in Plumbridge Street; from here there were steps down into the railway tunnel which was now back in industrial use.

After the war, the Helliot Machine Tool Company used the tunnel as a machine shop. Access into the tunnel was from the rear of the now much altered station building which was their office. At the rear of the building



The Southern Portal excavated during the construction of Robinscroft Mews in 1987. Photo by Nick Catford



Blackheath Hill Tunnel in March 2008. Photo by Nick Catford

there was an open balcony which was, in fact, part of the original footbridge linking the two platforms. The cutting had been largely infilled but a ramp down into the tunnel had been built to maintain access.

When visited by railway historians O. J. Morris and J. Pelham in 1956 and 1957, the stairs, retaining walls and the north end of the platforms were still visible and a number of hand-painted railway signs could still be made out on the walls.

In 1958, the Helliott Machine Tool Company moved to Greenwich Church Street and after remaining unused for several years the station and tunnel were occupied by R. Taylor & Co. Machine Tools from 1966. The company is no longer listed after 1969, but strangely the 1973 Kelly's Directory lists the Helliott Machine Tool Company back in occupation.

From c.1978 the site was occupied by a husband and wife team, Alan and Margaret Storey trading as Maganal or W. A. Storey (Plastics) Ltd. The company made road signs for local authorities. Many road signs in use today were either made by or designed by this company. They were the first people to standardise signage, lighting of signs and provide a catalogue of replacement parts. Alan Storey also pioneered the reflective sign and in conjunction produced the Universal clip, which was also made in the underground factory. The tunnel was used as their workshop and housed welding equipment, a cutting machine and a vacuum machine. In 1987 the company relocated to Peckham.

The station building was demolished later that year to make way for a new housing development called

Robinscroft Mews. Worried that the new development might subside into the tunnel, the southern portal was fully excavated and the north ends of the platforms were exposed, wooden shuttering was placed across the portal and the excavation backfilled with concrete.

The tunnel was visited by the author in March 2008. At this time, the two-storey brick building on Blackheath Hill was empty and available to let; the last occupier had been the Regency Bakers. The main access into the building is from Plumbridge Street with a

delivery entrance in the single-storey extension accessed from the service road behind the shops. There is a second set of double doors adjacent to this goods entrance which opens onto a flight of concrete steps going down 14 feet to a short passage. At the end of the passage a wooden door opens into the tunnel.

The remaining section of the twin-track brick-lined tunnel is 92 feet in length and 26 feet wide with two safety recesses in the side walls. At the north end, a concrete raft cuts through the tunnel to support the building above. There are several fluorescent light fittings fixed to the roof dating from the 1960s. The brickwork has been painted, but where one of the light fittings has become detached the original soot covering the tunnel roof can be seen.

At the north end of the tunnel metal rails can be seen in the concrete floor. The distance between them is 4' 8" (standard gauge) confirming that this is a section of original railway track. At the southern portal the wooden shuttering and the concrete infill behind it can clearly be seen.

Sources:

Terry Burr and Eleanor Monk - employees of W. A. Storey (Plastics) Ltd.

Cliff Marsh and Jean Ivermee – used the Sparta Street shelter during WW2.

A report on the remaining features of the Greenwich Park branch by O. J. Morris & J Pelham 1956/7.

Various minutes of the Greenwich ARP committee 1940–45.

Kelly's Directory (various) 1917 – 1987.

Area Combined Headquarters Chatham and HMS Wildfire

(C in C Nore, RN & AOC No 16 Group, RAF Coastal Command)

Bob Jenner

Creation of Area Combined Headquarters

During 1937, with the threat of war imminent, an exchange of letters between the Admiralty, Air Ministry and the War Office resulted in a policy for the provision of protected accommodation at the four main naval ports at Plymouth, Portsmouth, Chatham and Rosyth. It was decided that it would not be practicable or desirable to relocate the Military HQs to the coast so a small military liaison staff was allotted to each of the proposed HQs which the Admiralty and Air Ministry now proceeded to plan and build.

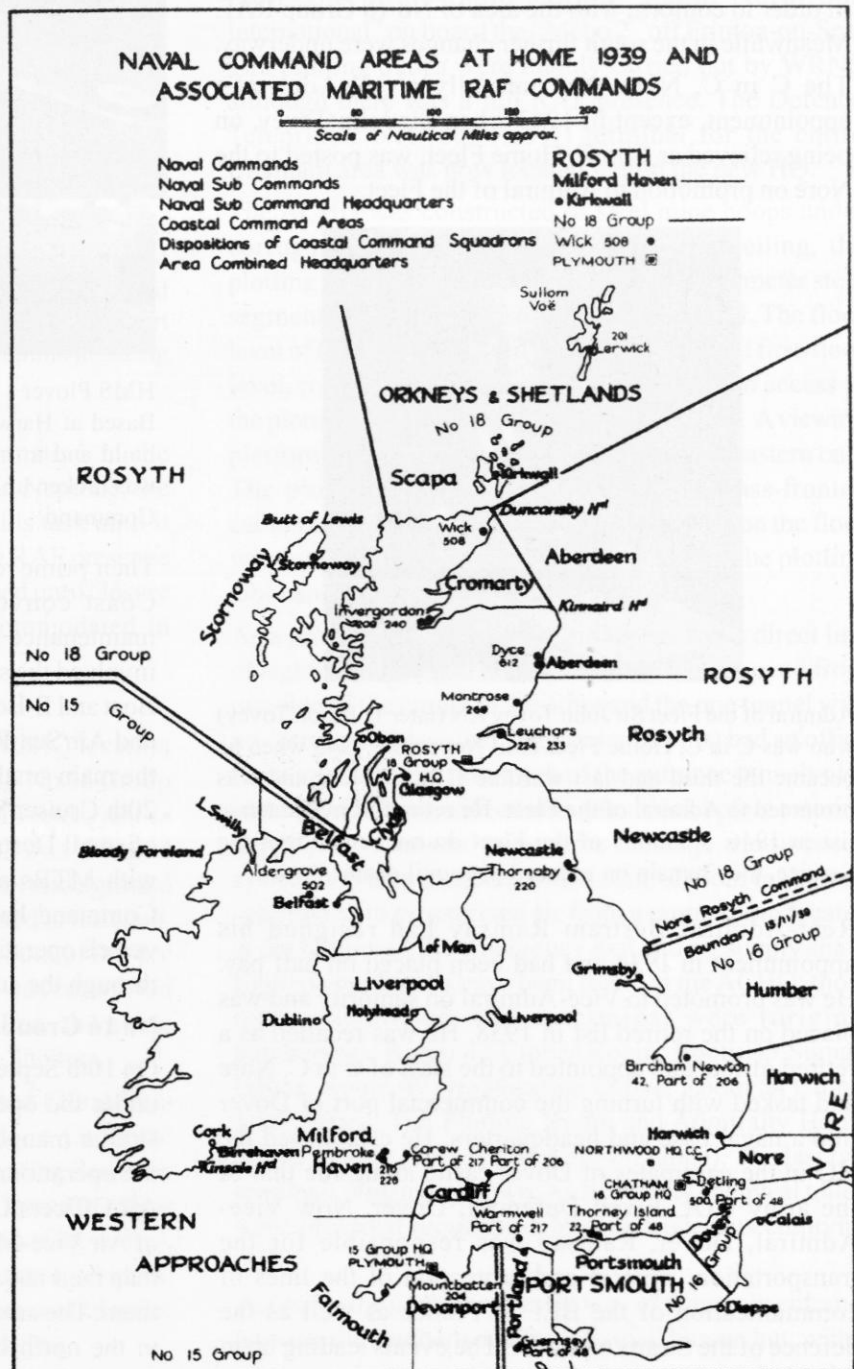
The protection against air attack was particularly pertinent for the Navy at Chatham. During the later stages of WW1 on the night of 3rd September 1917, when 900 men were sleeping in the drill shed at the barracks of HMS Pembroke, four German Gotha bombers carried out the first night air raid on the UK. One of the planes dropped two 50 kg bombs through the glass roof of the drill shed killing 130 with 88 seriously injured. It was the largest single loss of life due to air raids in WW1. Large underground shelters were dug into the wall of the barracks before WW2 began.

The plan to build these Area Combined Headquarters (ACHQs) involved the location of the Air Officer Commanding (AOC) No 15 Group, RAF Coastal Command with the naval Commander in Chief (C in C) Plymouth and Western Approaches at Mount Wise in Plymouth (HMS Drake). AOC No 16 Group, Coastal Command was located with the C in C Nore at Chatham (HMS Pembroke). Pitreavie Castle was to house the naval Flag Officer Rosyth (HMS Cochrane) and the AOC No 18 Group, Coastal Command.

The naval C in C Portsmouth (HMS Victory) was to relocate alone at Fort Southwick on Portsdown Hill. His area of command was covered by both No 15 (later No 19) and No 16 Groups. No 17 Group, Coastal Command at Gosport had a training role and no area responsibility. In August 1938 HQ Coastal Command moved from Wykeham House, Lee on Solent, Gosport to its new location at Eastbury House in

Northwood, northwest London and subsequently in 1943 into its protected HQ. This site then went on to become HMS Warrior and later the Permanent Joint HQ (PJHQ).

Following the outbreak of hostilities and the occupation of northern Europe, adjustments were required in the above arrangements. In June 1940 the naval command at Plymouth was split, with a new C in C Western Approaches (HMS Eaglet) and the AOC No 15 Group moving north to Liverpool and into protected accommodation in Derby House in February 1941. The



existing C in C Plymouth remained at Mount Wise where he was joined by the AOC of the newly formed No 19 Group to cover the South Western Approaches.

The design, size and construction of the five ACHQs are all different. Those at Mount Wise, Fort Southwick and Pitreavie Castle have been covered previously in SUBTERRANEA.

The Nore Command

The title originates from the name of a large sandbank in the Thames Estuary at the mouth of the River Medway and has been associated with the navy for centuries. At the beginning of the war the command covered from Rye in Sussex to Yarmouth in Norfolk. When the ACHQs were formed the northern boundary was moved north to Flamborough Head in Yorkshire taking over the Humber Sub Command from FO Rosyth on 13th December 1939 in order to conform with the area of No 16 Group RAF. Meanwhile in the south further changes were underway.

The C in C, Nore was normally a full Admiral's appointment, except in 1943 when Sir John Tovey, on being relieved as C in C, Home Fleet, was posted to the Nore on promotion to Admiral of the Fleet.



Admiral of the Fleet Sir John Tovey RN (later 1st Baron Tovey) who was C in C, Home Fleet until November 1943 when he became the third and last wartime C in C, Nore and was promoted to Admiral of the Fleet. He retired from the active list in 1946. Admirals of the Fleet do not retire from the Service, they remain on reduced pay until death.

Rear-Admiral Bertram Ramsay had resigned his appointment in 1934 and had been placed on half pay. He was promoted to Vice-Admiral on seniority and was placed on the retired list in 1938. He was recalled as a retired officer and appointed to the staff of C in C, Nore and tasked with turning the commercial port of Dover into a naval base and headquarters. He established the HQ in the casemates of Dover castle alongside that of the army GOC Fixed Defences, Dover. Now Vice-Admiral, Dover, Ramsay was responsible for the transportation, support and protection of the lines of communication of the BEF in France as well as the defence of the Straits of Dover. The events leading up to

the fall of France and the British Expeditionary Force (BEF) evacuation at Dunkirk had caused the Dover Sub Command to be removed from the control of C in C, Nore and placed directly under Admiralty control. The Sub Command was not restored to Nore until 1946. The southern boundary of Nore Command was now a line due east of the North Foreland in Kent.

The Nore Command at Chatham had five major sub commands each under the command of a Flag Officer (normally a Rear or Vice-Admiral). These sub commands were Chatham, London (less the Admiralty), Sheerness, Harwich and Humber. They were further subdivided into Bases under Naval Officers in Charge (NOIC) and Residential Naval Officers (RNO). Such bases included Gravesend, Southend, Queenborough, Brightlingsea, Yarmouth, Lowestoft, Felixstowe, Burnham-on-Crouch, Boston, Grimsby and Immingham.



HMS Plover - This coastal minelayer was launched in 1936. Based at Harwich, she carried 100 sea mines at a time, to build and to maintain the east-coast barrier minefield. She was broken up in 1969. This was a typical vessel of the Nore Command.

Their prime responsibilities were the protection of East-Coast convoys from air and sea attack, and the maintenance of the east-coast barrier minefield. This involved the sweeping of enemy mines, standing anti U-Boat and E-Boat patrols, naval attacks on enemy shipping and Air/Sea Rescue. The assets for these tasks were in the main small ships; apart from the light cruisers of the 20th Cruiser Squadron during 1940, the force consisted of small Destroyers, Sloops, Trawlers and Motor Boats with MTBs and MGBs for offence. At its peak Nore Command had over 50,000 personnel with some 900 vessels operating from 35 different bases and all controlled through the sub commands from the ACHQ.

No 16 Group, RAF Coastal Command

On 10th September 1940 Coastal Command was placed under the operational command of the Admiralty in a similar manner as the Army AA Command being under the operational control of RAF Fighter Command. The Air Officers Commanding (AOsC) at the ACHQs were of Air Vice-Marshal rank and therefore of a lower rank than their naval counterparts but were not subordinate to them. The area of No 16 Group matched that of the Nore in the north but stretched as far as Portsmouth in the

south covering the now independent Dover Sub Command and the eastern half of Portsmouth Command.

AOC 16 Group had for his task (in 1940) eight Squadrons of light aircraft (Blenheim, Hudson, Anson, Beaufort, Swordfish and Albacore) flying from six airfields from Thorney Island in the south to Thornaby in the north. He was charged with co-operation with the Fleet, providing air cover as well as anti-submarine patrols,



Avro Anson - (Faithful Annie) was a twin-engined light transport aircraft that came into service in 1936 and remained in service until 1969. Nearly 1,100 machines were built. Used for general reconnaissance (GR), training and light transport duties they formed the mainstay of Coastal Command during the early days of the war.

reconnaissance and air/sea rescue culminating in the protection of the eastern part of Operation Neptune, the D-Day landings. The Group carried out this task until it was reduced to Wing status in 1946 but the RAF presence at the ACHQ (by now a Local HQ) continued until closure in 1962, the RAF personnel being accommodated in Anson Block at HMS Pembroke.

ACHQ Chatham

At Chatham (C in C Nore), a temporary ACHQ location unknown, but probably the newly built RAF No 16 Group HQ, camp and W/T station in Black Lion Fields, just to the southwest of Medway Road camp, was deemed suitable for emergency use until a permanent underground bomb-proof tunnelled ACHQ was completed in the chalk hill west of Admiralty House and to the south of the dry moat of St Mary's Barracks. This project was contracted to Messrs Francois Cementation Co Ltd, the same company that built the Ramsgate Tunnel Shelters.

Whilst the tunnels were being constructed (22nd May 1939) the Civil Engineer in Chief (CE in C) at the Admiralty ordered that the floor of the Plotting Room be lowered by 2.5 feet, for better observation from the cabins (this being the approximate height of the plotting tables). The cost of the HQ was borne by the three services, against Vote 10 funding according to the amount of space allocated: RN 51%, RAF 45.5%, Army 3.5%.

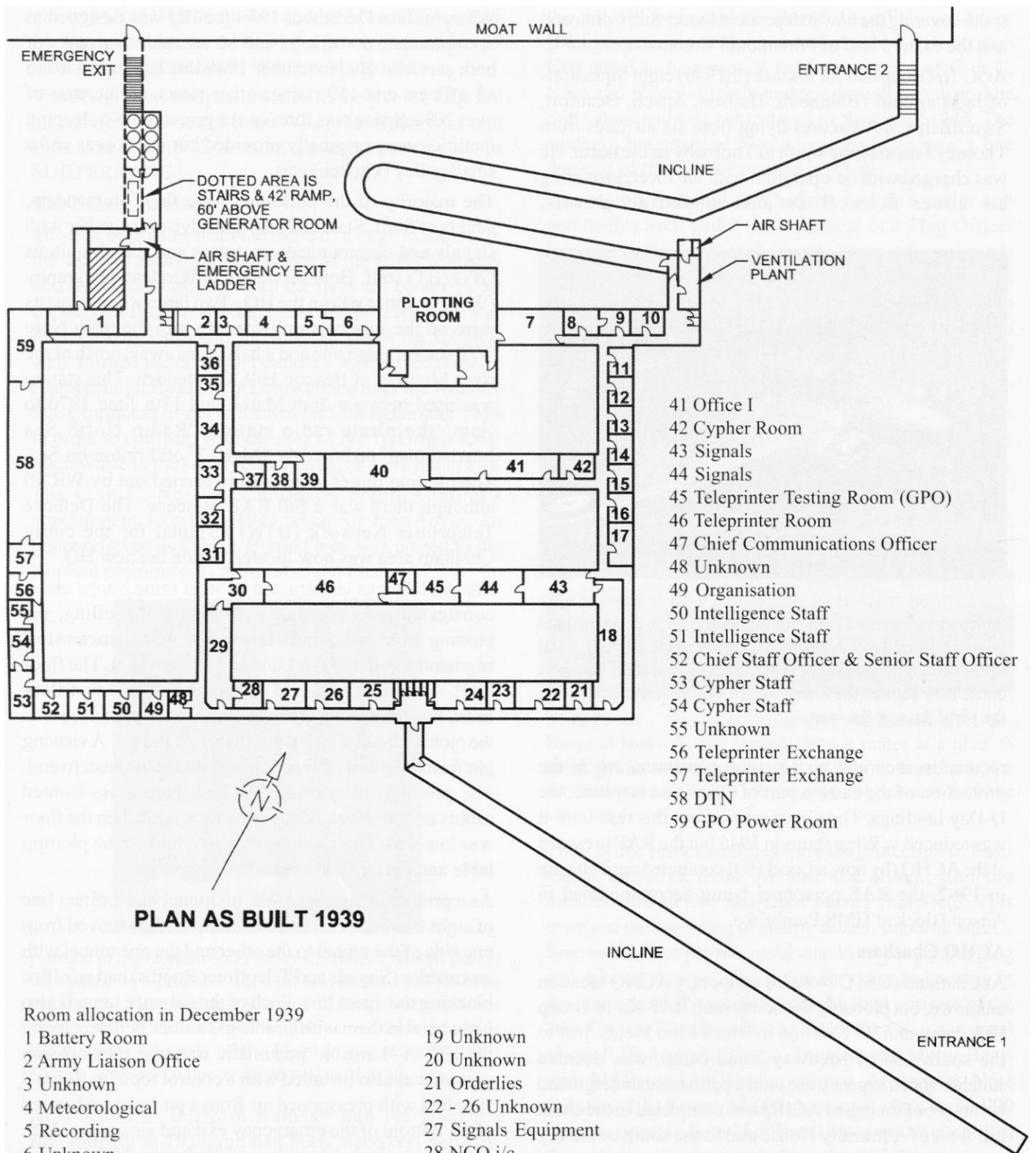
When built in December 1939 the HQ was designed to accommodate 60 officers and 90 ratings/other ranks of both services. By November 1940 this had increased to 63 officers and 119 ratings/other ranks, an increase of over 20%. Space was forever at a premium. No sleeping facilities were originally provided but rest rooms and a small galley (kitchen) was.

The majority of the personnel were the Commanders, Chiefs of Staff, Staff Officers and advisors together with signals and communications teams and the ubiquitous GPO (BT) staff. Both services had Wireless Telegraphy (W/T) facilities within the HQ. Two large wooden masts were on the surface above the HQ with the main Nore W/T station some one and a half miles away, north of the river Medway at Beacon Hill, Chattenden. This station was used between 26th March and 17th June 1970 to 'jam' the pirate radio station "Radio North Sea International" on board the "Mebo 2" off Frinton-on-Sea. The plotting duties were mainly carried out by WRNS although there was a full RAF presence. The Defence Teleprinter Network (DTN) terminal for the entire Chatham area was now located within the new HQ.

The ACHQ was constructed of steel mine hoops under corrugated iron sheeting with interior panelling, the plotting room being much larger with 40ft diameter steel segments similar to the London Underground. The floor level of the tunnels entered the plotting room at first-floor level, requiring steel stairs at each end to gain access to the plotting floor, which was effectively in a pit. A viewing platform overlooked the plotting table at the eastern end. The plotting room originally had three glass-fronted cabins at floor level, which became raised when the floor was lowered. These cabins now overlooked the plotting table and the vertical map boards opposite.

As a protection against blast, no tunnel had a direct line of sight from one end to the other, corridors moved from one side of the tunnel to the other and the one tunnel with no corridor (Signals and Teleprinter Rooms) had an office blocking the direct line. Each of the entrance tunnels also had a bend in them with an anti-gas airlock before entering the HQ. A 'Lamson' pneumatic message transmission system was also installed with a control room in Room 3 supplied with pressurised air from a pump room located at the bottom of the emergency exit and air supply shaft. Eight pairs of tubes have been found at the ACHQ; those rooms identified with a terminal were (original numbering): Room 42 Cipher Room, Room 43 Signals Office, Room 49 Organisation Office, Room 54 Cipher Staff Office, The Plotting Room and Admiralty House on the surface (well within Lamson range). The last two terminals remain unknown. As built, only chemical toilets were provided requiring a long and odorous emptying task.

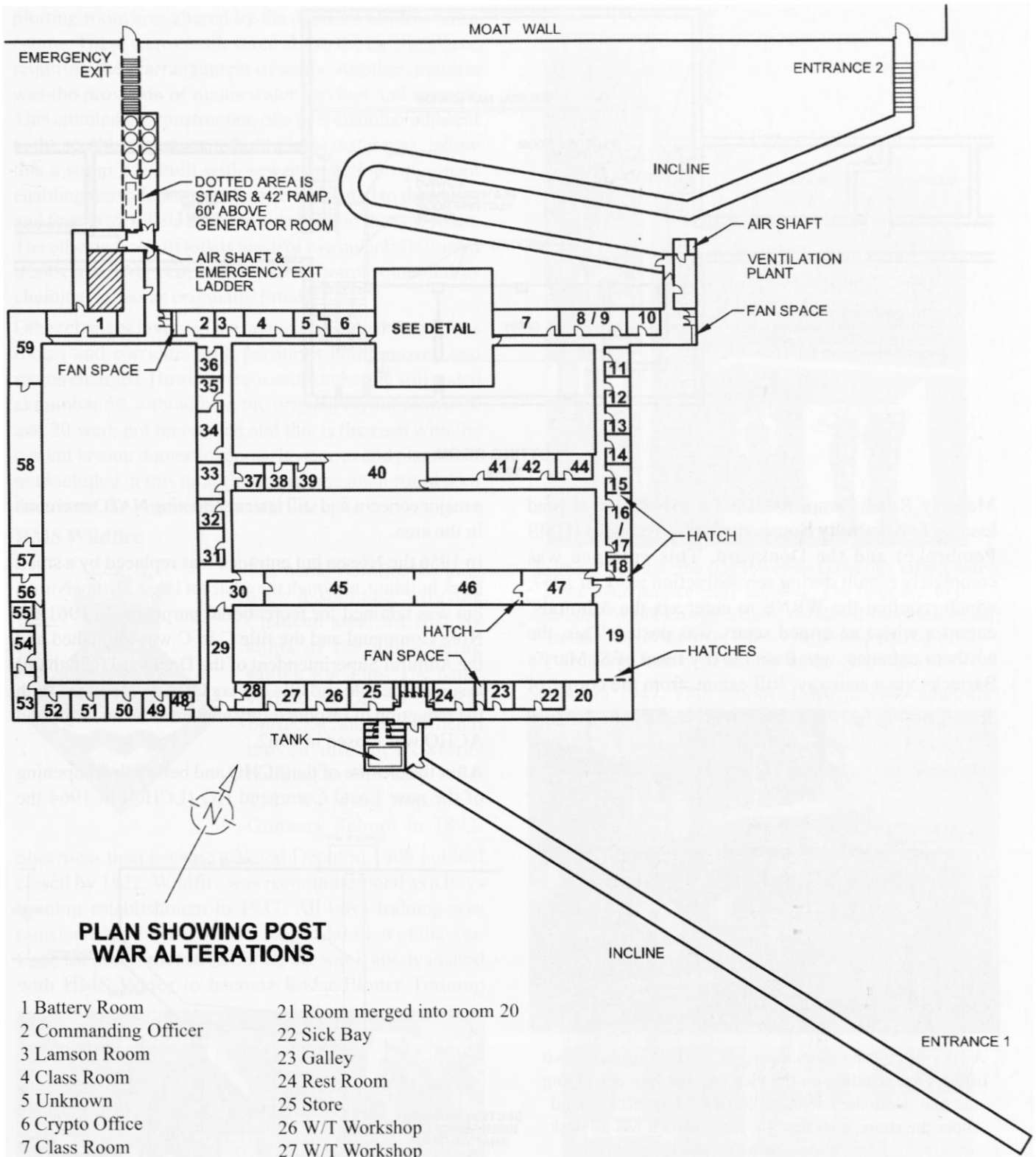
Access to the complex was by way of two main entrance tunnels, the southern one from a small Nissen hut, within



PLAN AS BUILT 1939

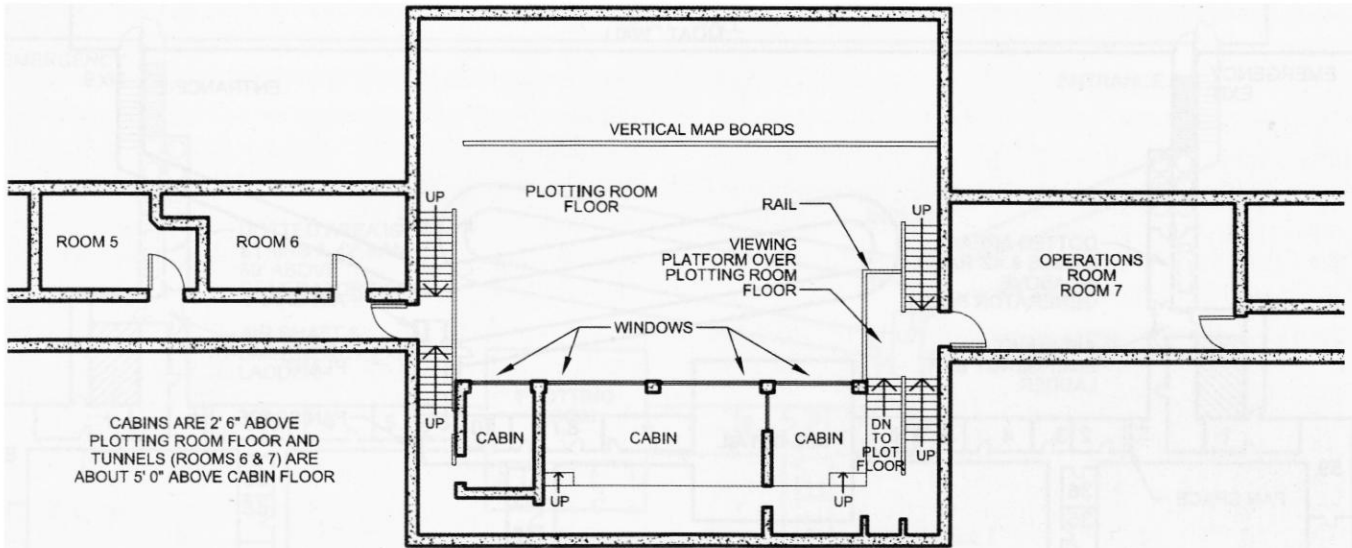
Room allocation in December 1939

- | | |
|--|--|
| 1 Battery Room | 19 Unknown |
| 2 Army Liaison Office | 20 Unknown |
| 3 Unknown | 21 Orderlies |
| 4 Meteorological | 22 - 26 Unknown |
| 5 Recording | 27 Signals Equipment |
| 6 Unknown | 28 NCO i/c |
| 7 Operations Room | 29 Signals |
| 8 C in C, Nore. RN | 30 Signals |
| 9 AOC No 16 Group. RAF | 31 Training & Engineering |
| 10 Rear-Admiral (Ops) & Deputy Chief of Staff | 32 Senior Administration Staff Officer (SASO) |
| 11 Passive Defence Room | 33 Secret Registry |
| 12 Chief of Staff & Staff Officer (Plans) | 34 Air Staff Clerks |
| 13 Staff Officer (Ops) & Staff Officer (Convoys) | 35 Central Registry |
| 14 PSO | 36 Army Section |
| 15 Messengers | 37 Air Staff Clerks |
| 16 Staff Officer M/S | 38 Sqdn Ldr, Armament & Ground Gunnery Officer |
| 17 Staff Officer (1) | 39 Sqdn Ldr, Navigation |
| 18 W/T Room | 40 Office II |



PLAN SHOWING POST WAR ALTERATIONS

- | | | |
|----------------------|--------------------------------|------------------------------------|
| 1 Battery Room | 21 Room merged into room 20 | |
| 2 Commanding Officer | 22 Sick Bay | |
| 3 Lamson Room | 23 Galley | |
| 4 Class Room | 24 Rest Room | |
| 5 Unknown | 25 Store | |
| 6 Crypto Office | 26 W/T Workshop | |
| 7 Class Room | 27 W/T Workshop | |
| 8 Class Room | 28 W/T Room | |
| 9 Class Room | 29 Class Room | |
| 10 Chart Store | 30 Chief Communications Yeoman | |
| 11/12 Unknown | 31-33 Unknown | |
| 13 Store | 34 Admin Office | |
| 14 Unknown | 35 Permanent Staff Instructor | |
| 15 Flammable Store | 36-39 Unknown | |
| 16 Radio Room | 40 Conference Room | |
| 17 Radio Room | 41-44 Unknown | |
| 18 Unknown | 45 Teleprinter Room | |
| 19 Class Room | 46 Teleprinter Room | |
| 20 Class Room | 47 Main Signal Office (MSO) | |
| | | 48 Store |
| | | 49 X.O. (1st Lt) |
| | | 50 Interview Room |
| | | 51 Telephone Exchange |
| | | 52 Battery Room/Male Changing Room |
| | | 53 Wardroom (Officers Mess) |
| | | 54 Unknown |
| | | 55 Store |
| | | 56 GPO/BT Room |
| | | 57 GPO/BT Room |
| | | 58 GPO/BT DTN Room |
| | | 59 GPO/BT Power Room |



**PLOTTING ROOM
1939**

Medway Road Camp, itself off a private naval road leading to Admiralty House, the Naval Barracks (HMS Pembroke) and the Dockyard. This entrance was completely rebuilt during reconstruction work in 1957, which required the WRNS to enter via the Admirals' entrance where an armed sentry was posted. This, the northern entrance, was from the dry moat of St Mary's Barracks via a stairway, still extant, from the corner of

a major concern and still later conducting NATO exercises in the area.

In 1956 the Nissen hut entrance was replaced by a small brick building, although the adjacent large 24-foot Nissen hut was retained for recreational purposes. In 1961 the Nore Command and the title C in C was abolished and the Admiral Superintendent of the Dockyard (Chatham) assumed the role and title of Flag Officer, Medway. With the reduction of responsibility and area, the underground ACHQ was closed in 1962.

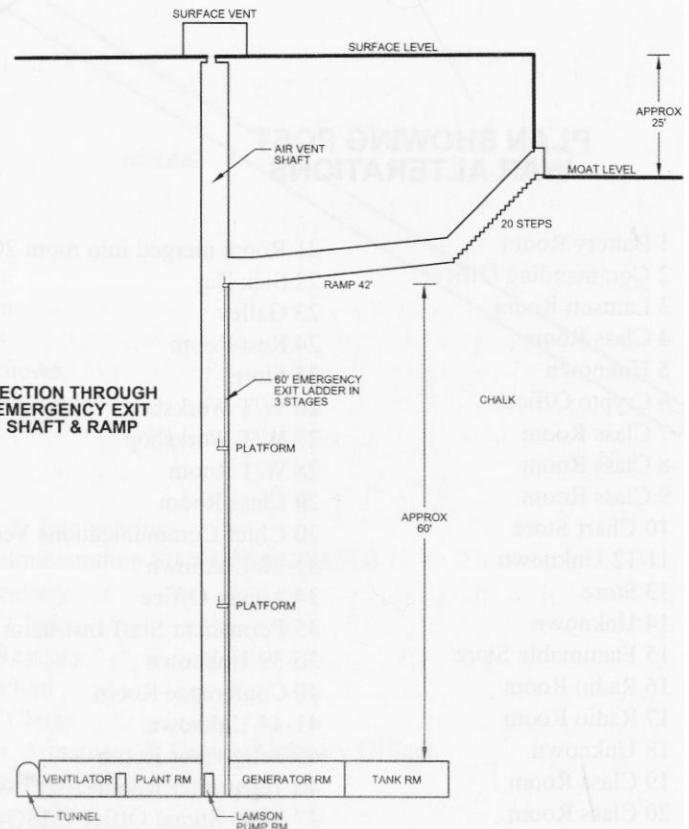
After the closure of the ACHQ and before the reopening of the now Local Command HQ (LCHQ) in 1964 the



A view of plotting room during WW2 looking east. Two officers are standing on the viewing platform discussing the plot. Note the telephone PMBX in the background under the stairs, also that the cabin shown has no desk under the window.

the formal garden of Admiralty House. There was an emergency exit from the western plant area of the HQ, via three 20ft ladders, that went up one of the two vertical air shafts that served both ventilation rooms and provided an exhaust for the emergency generator. This exit emerged in the dry moat to the west of the northern entrance.

After the war had ended the ACHQ, complete with a RAF component now accommodated in Anson Block of the naval barracks HMS Pembroke, continued to function with the clearing of both enemy and allied minefields being



plotting room was altered by the addition of three extra cabins. These were cantilevered above the existing three requiring the rearrangement of stairs. Another addition was the provision of mains water services and sewage. This entailed the construction of a new chamber adjacent to the southern entrance to hold a large water tank; below this a sump was built with sewage ejection equipment enabling the toilets opposite to be connected to the mains and four extra toilets to be provided within the new room. The other two sets of toilets (each of two cubicles) situated beside the two ventilation plant rooms remained as chemical toilets as originally fitted.

Other changes involved the layout and size of the various rooms and corridors with partitions being moved and rooms enlarged. However the room numbering still ended at number 59, although on the original layout rooms 19 and 20 were not reconciled and this is the case with the current layout; domestic rooms, lavatories and plant were not included in this total (however, one plant room door does have the number 75 on it).

HMS Wildfire



The name Wildfire has long been associated with the Chatham area, the first six ships of the name being sailing warships. The name shifted ashore to the RN Barracks, Sheerness when it moved into an ex-stores building in February 1854. This building became a Gunnery School in 1892.

Sheerness then became a Naval Depot in 1908 but had closed by 1922. Wildfire was recommissioned as a boys training establishment in 1937. All boys training was transferred to the Isle of Man for the duration of the war. Used for accommodation during the war it amalgamated with HMS Vector to become Radar Plotter Training

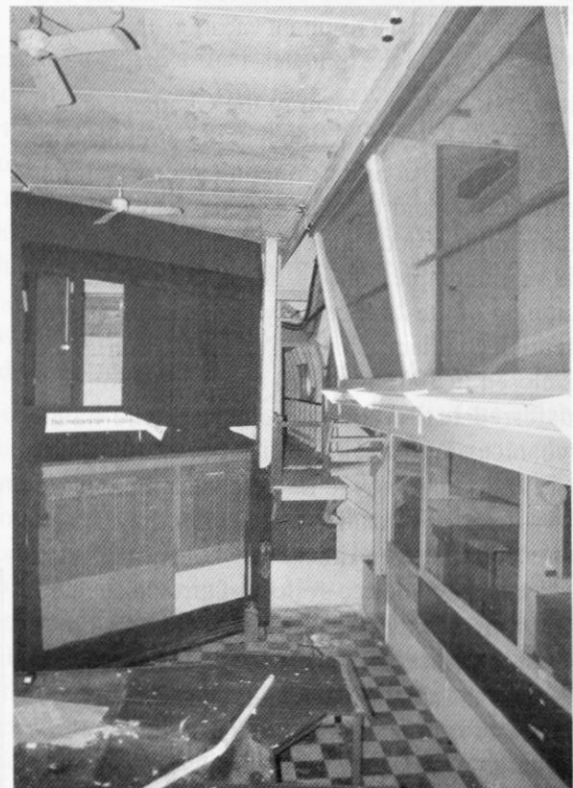


Room 46, Teleprinter room during the RNR 'Wildfire' period, looking towards the MSO (room 47)

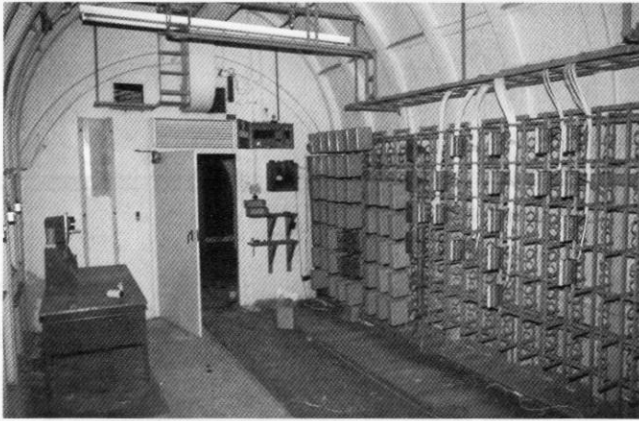


'Evening Colours' the flag lowering ceremony taking place at the main surface entry building. The flags are, to the right, the 'White Ensign' flag of the Royal Navy and to the left the flag of the Flag Officer, Medway, the flag of St George with two red balls in the outer corners.

School in 1947. This school closed in 1949 when the function was transferred to HMS Dryad at Portsmouth and HMS Harrier at Kete in Pembrokeshire. From 1954 until 14th October 1959 Wildfire was the Sheerness Accommodation Centre.



'Ops Room' in 1987 – Photo from Sub Brit Collection



Room 58 GPO/BT DTN room showing MDF and relays on the right with control equipment on desk to the left – Photo from Sub Brit Collection

During 1958 the Royal Naval Volunteer Reserve (RNVR) was absorbed into the Royal Naval Reserve (RNR). Among the new shore service roles for the RNR were the RNR HQ Units working in Maritime HQs at the Major Ports. In 1963 the RNR established such a unit in the recently closed ACHQ at Chatham, being commissioned as HMS Wildfire on 10th September 1964.

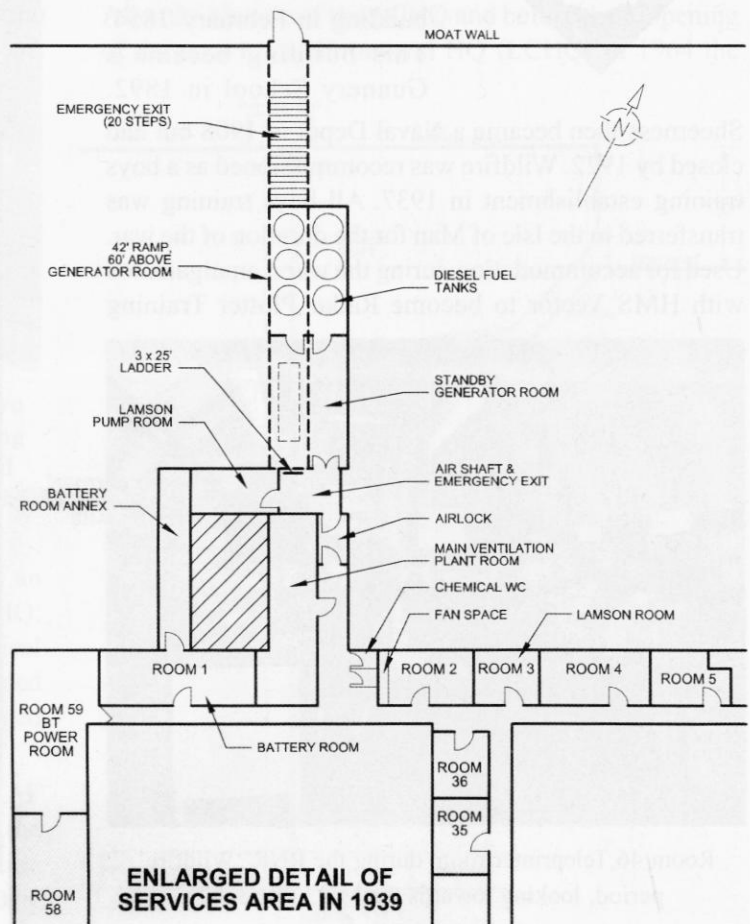
The function of the unit was to provide a trained and stable staff for plotting and communications duties in the Flag Officer, Medway's operational headquarters now entitled Local Command Head Quarters (LCHQ) in time of war. Ratings were training in both of these trades; in addition Officers specialised in Naval Control of Shipping (NCS), Mine Counter Measure (MCM) and Intelligence duties. With the closure of Chatham as a naval base in 1983 the requirement for the HQ Unit ceased, with the resultant vacation and closure of the LCHQ and the tunnels.

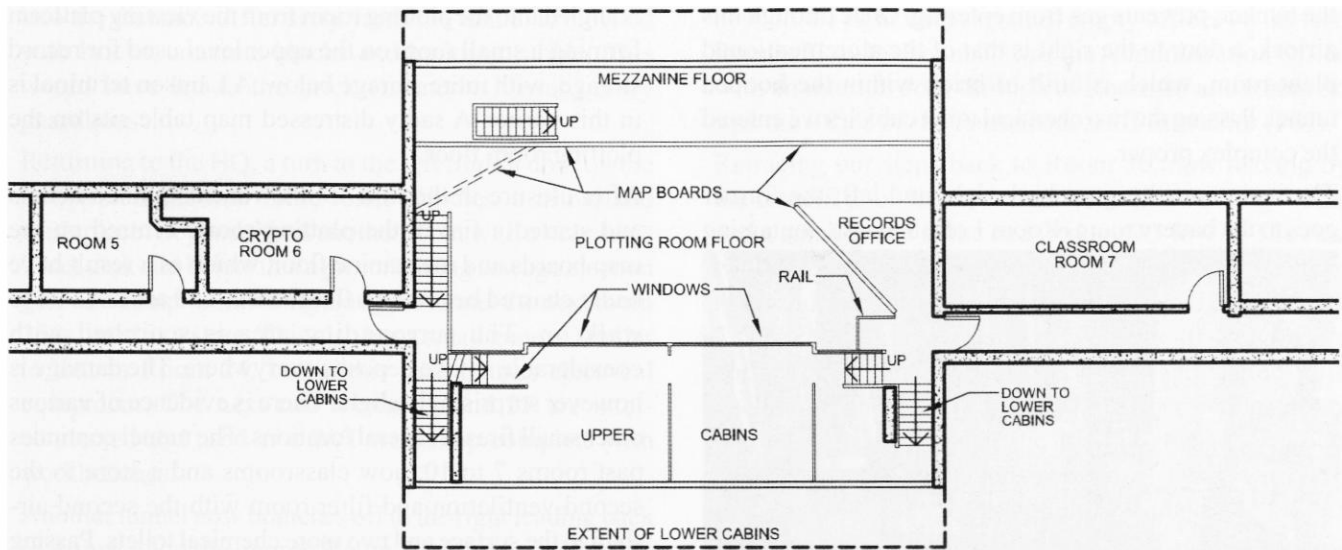
If the RNR was to remain in the Chatham area a new site and a new function had to be found. The role was to be that of a Communications Training Centre (CTC) and the site selected was the then vacant Collingwood Block in nearby Khyber Road. This small complex of buildings began life at the beginning of the 20th century as the Royal Naval Detention Quarters, Chatham (Naval Prison). This was closed in 1931 when all naval detention was transferred to Portsmouth. In 1932 the naval Mechanical Training Establishment (MTE) for Artificer training moved into the vacant premises and was named Fisguard Block. Collingwood Block was added at the same time. The whole lies directly over the large elaborate system of air raid shelters built for the naval barracks just before WW2 and referred to earlier. Air vents serving these shelters still appear at various locations in the area. By 1960 all Artificer training moved to Plymouth and the MTE became the Dockyard Technical College until July 1971 when this too closed.

Now called 'Medway CTC'-HMS Wildfire, the new HQ opened in December 1983 and was formally commissioned in October 1984. In 1988 yet another change of function took place, the unit now training Operations HQ staff. The latest change took place in 2000 when the name "HMS Wildfire" was transferred to the RNR unit at Northwood in northwest London to serve the Permanent Joint Headquarters (PJHQ) and the Medway unit became the Chatham Division of the London RNR, HMS President.

The Wildfire site has been on the 'must do' list for a long time. The recent acquisition of the Sub Brit Collection which contains a set of photographs of Wildfire, taken in July 1987, brought the subject to the fore. A casual reconnaissance of the area revealed a large active building site. Enquiry to the contractors led to the site owners, Mid Kent College, whose campus occupied the former Chatham Naval Barracks (HMS Pembroke) site. A need to extend the College and to provide student accommodation has resulted in the development of the area overlaying 'Wildfire' between Khyber Road and Cumberland Road. Following the granting of planning permission the College cut open a moat door to 'Wildfire' in August 2007 to conduct a pre-building survey. The door was resealed on completion.

At this time the College gave serious consideration to the possible utilisation of the HQ but all options proved to be prohibitively expensive. The present plan is to block the two moat entrances, each with a very large concrete





**PLOTTING ROOM
SHOWING POST WAR
ALTERATIONS**

block faced with brickwork matching the moat wall; this would ensure future access, albeit with the use of a large crane. The southern or main entrance has had the entrance building demolished and the tunnel blocked with building concrete and rubble. The two ventilation shafts have been capped with two large concrete slabs, semi-buried and landscaped over. The area over 'Wildfire' will be a large car park whilst the new accommodation blocks will be to the west towards Khyber Road. To the north a new footbridge will cross the moat, giving direct access via a new staircase to the College. The remainder of the site will be landscaped and an open space/park created.

Tour of Tunnels

Our approach to Mid Kent College resulted in readily-given permission to cut open, photograph and record the HQ and to reseal it on completion. Consultation with Kent Underground Research Group (KURG) who had the necessary equipment and experience to undertake entry and sealing led to a joint enterprise taking place on Saturday 16th February 2008 with two representatives of Canterbury Archaeological Society and a local historian in attendance. As the location was almost in the backyard of the new Kent Police Area HQ we made a courtesy call there. We had permission to remove a section of fence to allow vehicles carrying equipment into the moat and up to the doors. We were to enter by way of the original emergency exit which had had a large steel plate welded over it.

Cutting a large hole in this plate with a disc cutter revealed the original door which also had to be cut open, taking over two hours to complete, much longer than anticipated. Following a pause to allow the exhaust fumes from the generator to clear, an entry was made to meter the air quality. This being satisfactory, a descent down a set of steps led to a forty-two foot, down-sloping, ramp, which

KURG's Paul Thorne cutting through the emergency exit door.
Photo by Nick Catford



breached a large vertical shaft some sixty feet above the floor of the bunker. This shaft extended upwards for a further twenty-five feet, emerging on the high ground above the moat. Three twenty-foot ladders each ending on a small platform led to the bottom of the shaft, which apart from being one of two airshafts, contained an exhaust trunking for the emergency generator and various other services and cables. Descent of the ladders was very slow as only one person was allowed onto each ladder and platform at a time.

The shaft bottom has three sets of doors (see enlarged sketch); one pair on the north side led to the emergency generator room with beyond that a further room still containing six large round diesel fuel tanks. These two rooms together with the main ventilation and filtering plant room are of mine hoop and corrugated iron construction. Returning to the shaft bottom, a small door in the west wall led to a brick-built Lamson pump room complete with fan and large diameter circular trunks. The final door in the south face was the outer door of the airlock, leading into the tunnels. Each of the three entrances has an airlock at the entry point which, with overpressure in

the bunker, prevents gas from entering. Once through this airlock, a door to the right is that of the aforementioned plant room, which is built of brick within the hooped tunnel. Passing the two chemical toilet cubicles we entered the complex proper.

The main corridor goes both right and left; the former goes to the battery room (Room 1 on all plans), containing



View of the plotting room after it had been closed and the vandals visited. The seat of the fire can be seen at the bottom of the map boards on the left of the picture. The sadly distressed plotting table fills the centre of the room.

Photo by Nick Catford

the wooden battery frames - this has a small brick annexe behind it. The corridor turns ninety degrees to the left past this room into the last room (Room 59), which will be returned to later. The corridor to the left goes into the heart of the complex, past a small fan space on the left, then offices (Rooms 2-6): Room 2 was the Commanding Officer's office (CO), Room 3 was the Lamson control room. Another tunnel leads off to the right, opposite Room 3. Room 4 is a classroom, 5 is unknown and 6 the Crypto Room. Beyond Room 6, we enter the double height, forty-foot diameter, Plotting Room from the west end, onto a small square platform, leading from which is a long stair down to the plotting room floor, a shorter stair down to the lower cabin level and a short stair up to the front of the upper level cabins. Both levels have three glass-fronted cabins overlooking the plotting room. Beyond the eastern lower cabin is a small lobby with four steps down to the plotting floor and a stair up to what was originally a viewing platform leading to the rest of the tunnels. A further short stair led up to the front of the upper cabins in a similar fashion to the other end.

The upper cabins were a postwar addition and are cantilevered out into the plotting room to allow for the curvature of the roof, which is now hidden by a false ceiling. Opposite the cabins are a series of full-height map boards with a mezzanine floor behind, accessed by a further small staircase. Another full-height map board

is angled into the plotting room from the viewing platform forming a small room on the upper level used for record storage, with more storage below. A Lamson terminal is in this corner. A sadly distressed map table sits on the plotting room floor.

After closure in the mid 1980s, vandals gained access and started a fire in the plotting room, centred on the map boards and mezzanine floor, which as a result have badly charred beams and floorboards and are not safe to walk on. The surrounding area is scorched with considerable smoke deposits everywhere. The damage is however surprisingly slight. There is evidence of various other small fires at several locations. The tunnel continues past rooms 7 to 10, now classrooms and a store to the second ventilation and filter room with the second air-shaft to the surface and two more chemical toilets. Passing through an airlock, there is a long steeply sloping tunnel which doubles back 180 degrees on itself. This reaches a short staircase and a door exiting into the moat a short distance from the emergency exit door.

It should be noted that there are two different partial lists, of unknown dates, of post-1964 room titles; any description given here is only a guide and cannot be guaranteed. Retracing our steps to Room 9, a tunnel heads south with a corridor on the right-hand side and offices 11 to 18 on the left. 11 to 13 are empty rooms, 14 has a blackboard at one end and shelving along one wall. Room 15 is a storeroom complete with desk, shelves and cupboards and what appears to be an issue hatch into the next room, which is two rooms 16 and 17, knocked into one, labelled Receiver Room. Another tunnel leads off to the west opposite Room 15 more of which later. The last room in this corridor is Room 18, a small room, with a large telephone junction box on one wall and a hatch into Room 19. On reaching Room 18, a door to the right enters yet another cross-tunnel. A door to the left takes you back into the previous tunnel and into Room 19 (once the W/T annexe) now a classroom. The original corridor has been completely removed from this room which now occupies the full width of the tunnel. The north end has the hatch into Room 18 above three fitted communications desks. The other end of this room has two more hatches, one each side of a central door leading into Room 20

Room 20 is the first room along the southernmost tunnel; now a classroom, it has been enlarged by the removal of the walls of what was Room 21, the original 'Orderlies Room'; it is also equipped with fitted communication desks and tables. Passing Room 22, the empty sickbay, the next room, 23, is a small galley with fitted sink and draining board and cupboards. Next, between Rooms 23 and 24 is a small fan space. Room 24 is listed as a fire fighting equipment store; this has a small washbasin annexe at the end. The tunnel now widens with four toilet cubicles on the right and the main entrance on the left. Entering this tunnel through two gas air-lock doors, it bends to the left and sloping steeply upwards, disappears

into the distance. After sixty yards the tunnel is blocked with bricks, concrete blocks and building rubble. This would have led to the brick (formerly Nissen) entry guardhouse.

Returning to the HQ, a turn to the left finds a door on the left, which has four more toilet cubicles, a urinal and wash place. Beyond this is another room with a very large water tank and below this a pit containing sewage ejection gear and sump. Continuing along the tunnel the next room 25 is listed as a store. This also has a small annexe similar to that in Room 24, but in this case houses electrical equipment. The next two rooms 26 and 27 are interconnected and used as a W/T workshop complete with workbenches.

Another tunnel now branches off to the right leading back to Room 3 and the door to Room 29. Continuing on, the corridor moves to the right-hand side of the tunnel. The first room, Room 48, another store, has the door from



Room 45, Teleprinter Room. Viewed from room 30 through the folding doors. A GPO 10 x 40 PMBX switchboard and equipment racking can be seen on the left with operator benches beyond. Photo by Nick Catford

the lobby, not the corridor. The second room is the First Lieutenant's (XO) office. The next room, 50 is an Interview Room. The final two rooms in this corridor are the Telephone Exchange and its Battery Room (this latter room has also been labelled as a male changing room). Turning right for the last time on the outer ring, we find Rooms 53 Wardroom (Officers Mess), 54 (empty) and 55 Store (also empty) which lead to GPO/BT territory. From here Room 56 is a workshop store, Room 58 is the main Defence Teleprinter Network (DTN) equipment room (still with a few racks in place) and finally Power Room 59 next to where we started at Room 1.

Moving back to the southernmost corridor and room 29, another classroom, immediately on the right on entering is the door to Room 28 named Radio Stockroom. Going through a central door at the end of the classroom brings us to a unique room in that it is actually in two tunnels, with doors leading in three directions. This has been labelled 'Chief Communications Yeoman' (CCY), leaving this room by the northern door we re-enter the corridor,

now on the right with six small empty offices on the left, Rooms 31 to 36. Room 34 was the Administration Office with an internal door through to Room 35 and Room 36 was the office of the Permanent Staff Instructor (PSI).

Retracing our steps back to Room 30, now leaving by the eastern door we enter a tunnel with two long rooms and a smaller one at the end (Rooms 45 to 47). The first two were teleprinter rooms with a folding door between them and the final room, the Main Signals Office (MSO). The T/P rooms held a double GPO 10 x 40 switchboard and an adjacent MDF. Both sides were fitted with operator's benches, still with electrical connections. There is a message hatch beside the door into the MSO, which contains a bench and a Lamson terminal. Of the two doors at the end of this room, the left one enters the eastern tunnel at Room 18 whilst the right one leads directly into Room 19.

The last tunnel runs parallel to the last mentioned one and runs from Rooms 37 to 44.

A short corridor leading east from Room 33 has three small empty rooms to the right; a door then enters a long, full-width Conference Room with a further corridor leading off on the opposite side with two further rooms now on the left. The first one is numbered 41/42 and with two doors is another classroom. The next room, also a classroom, is the final room on our tour; this room contains another Lamson terminal having been a signals office.

All in all the tunnels are in quite a good condition, with very little damp, and not a lot of damage or graffiti. Most rooms are painted in cream or pale apple green and are basically clean.

References and Sources

- National Archives (PRO)
 ADM 1/1119 Combined HQ's 1937-41
 ADM 1/10956 Chatham AHQ 1939-41
 ADM 1/16263 Admin of Combined Ops in Nore Command 1944
 AIR 28/ 304 16 Group RAF. ORB
 AIR 16/ 58916 Wing RAF. ORB
 AIR19/147 Protected Places (RAF) Order No 5 1941
 AIR 15/ 4 Role of Coastal Command 1937-1940
 Q41 and beyond Story of a Wren Telegraphist Shirley Lawson
 Battle of the East Coast J P Foynes
 Chatham Naval Dockyard and Barracks David T Hughes
 Sheerness Naval Dockyard and Garrison David T Hughes
 Shore Establishments of Royal Navy Lt Cdr B Warlow. RN
 Coastal Command Ian Carter (IWM)
 The Defence of the United Kingdom HMSO. Collier
 Royal Air Force Handbook 1939-45 Chaz Bowyer
 British Barracks 1600-1914 James Dovet
 Deserted Bastions Ed- Marianne Watson-Smyth
 Churchill's Navy. The ships, men and organisation
 Brian Lavery
 The Royal Navy's Reserve in War and Peace Stephen Howarth
 The Source Book of the RAF Ken Delve.
 The Cinderella Service. RAF Coastal Command 39-45
 Andrew Hendrie
 HMS Wildfire Website. www.hmswildfire.org.uk/index.htm
 Plans by Bob Jenner, redrawn by Tim Robinson.

Erith Hospital

WW2 Field Hospital Casualty Station and postwar X-Ray Department

Nesta Caiger

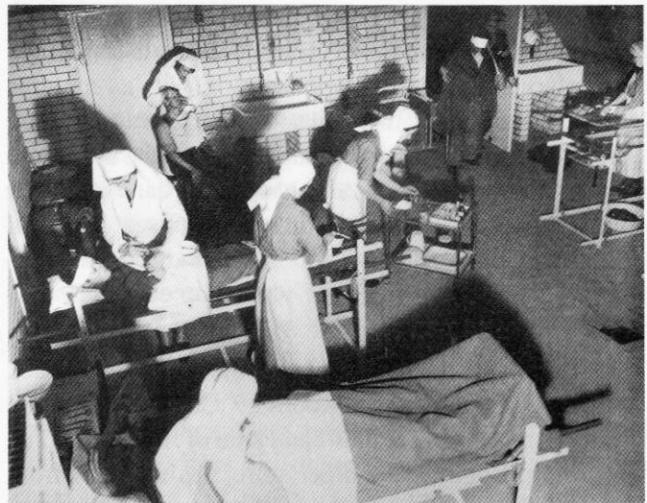
Patients arriving for an X-Ray at Erith Hospital often express interest in the unusual layout of the X-Ray department and from its exterior and interior appearance assume that it was originally converted from an old air-raid shelter. In this assumption they are partly correct, as the building is almost entirely underground. The roof has a thick covering of earth, grass and trees and it is entered through double doors via long sloping ramps to each doorway.

It is, however, a most interesting example of a Civilian Field Hospital Casualty Station, believed to be one of only six of this particular design to be built in the UK. It was constructed in 1938 by Erith Borough Council and opened in 1939, being fully operational at the outbreak of World War II. Though it saw only limited use under enemy action, it was constantly manned during the war years and was described as being Erith's 'Magnet Line'.

History

Erith Hospital, formerly Erith Cottage Hospital and now part of Queen Mary's Sidcup NHS Trust Hospital, was built in 1923 and ceremonially opened by the Prince of Wales, later Edward VIII, on 19th November 1924. The original Cottage Hospital, situated in Crayford Road, Erith, had been opened in 1871, when two villas named 'Sun Cottages' had been converted to meet the needs of what was then a small riverside village. It had six beds but this number soon proved inadequate for an expanding population, so in July 1875 another site was found in High Street, Erith and a larger Cottage Hospital came into being. This building had accommodation for nine adults and three children but within a few years this, too, had become inadequate. There was, for instance, only one bath for both patients and staff and a patient being admitted was carried bodily into a ward as the stairs were not wide enough to admit a stretcher.

By 1911, the population had expanded from some 8,000 people in 1871 to about 28,000 so, in order to alleviate a growing demand for hospital treatment, a Hospital Building Committee was formed and methods of raising funds were discussed. In only two years, £13,000 had been raised and a



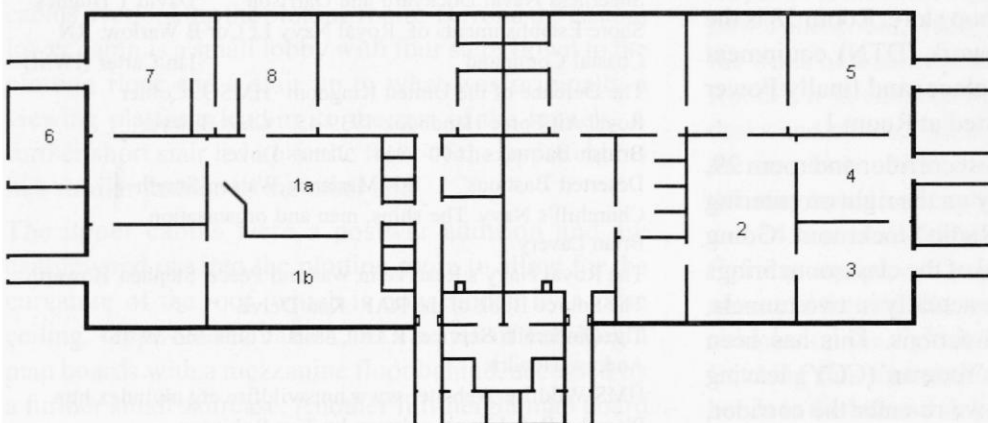
An exercise in the men's surgery in October 1939

generous gift of land by a Mr Gunning was accepted, this being situated at the top of Park Crescent. Here the new hospital was built and, indeed, still stands. It had a total of 21 beds but by the 1930s demand had again grown to such an extent that a number of outbuildings and additions were completed. Facilities within the hospital were also renewed or improved; the Operating Theatre was enlarged and re-equipped and an Anaesthetic room was added. In 1934, the first X-Ray Department was opened.

In 1948, Erith Cottage Hospital became part of the Woolwich Group of Hospitals and its name was changed to Erith & District Hospital. Up until this time, the X-Ray department had been situated in the main hospital building but, in an era when T.B. was still all too common and a much-dreaded disease, screening and treatment of patients at the hospital was out-growing the somewhat limited facilities of the existing X-Ray department. For instance, in 1939 there were 1,362 X-Ray examinations but by the following year this had risen to 1,637. Therefore, in 1950, the Field Hospital, unused since the end of the war, was converted into an X-Ray Dept, a function for which it was ideally suited. For a time, the Out-Patients Chest Clinics were conducted here several times a week. Very few structural alterations were

needed except for a flimsy partition wall or two and the building remains as originally constructed. Being partly underground, however, a very substantial air-conditioning system was installed.

It is interesting to note that the first Erith Cottage Hospital in Crayford Road had as one of its Presidents Sir William Jenner and serving as a



member of the Hospital Committee was none other than Dr Flaxman Spurrell, father of the famous Kentish archaeologist and expert on underground chambers and deneholes, F.C.J. Spurrell. In the last decade Erith Hospital has survived many threats of closure and in 1987 the last ward was closed and the in-Patients service discontinued. The Out-Patients Dept has been retained but on a much reduced scale, together with a slimmed down X-Ray service still safe in its underground bunker. The X-Ray department was temporarily closed in 2003 for refurbishment and the installation of new equipment.

Structure

Visitors to the department express amazement at the vast number of rooms which are contained within a relatively small area. There are some 50 rooms of varying size. This number includes dressing cubicles and walk-in cupboards for film storage, etc. but most of the rooms are of good size and some are positively spacious. The ceilings are domed and lofty, giving the impression of an oversize 'Anderson' shelter. There is a most interesting attic area which is entered (by ladder) through a small doorway above the doorway of room 1 on the plan or through a similar door placed high up in the wall of room 2. This attic spans a good area of the main building and the strong roof supports needed to bear the great weight of the overlying burden of earth can be seen. The whole building was built to be 'Bomb Proof' but one will never know since this was never put to the test. The dividing walls between rooms 3, 4 and 5 are very strong and probably double as load bearers and blast walls. The same applied to the opposite end of the building but some alteration has gone on between the rooms so that it now appears to differ from the original design.

All the rooms are artificially lit but there are about eight small reinforced windows high up in the walls, four at the front and four at the back of the building. Due to the great amount of electricity needed to run the X-Ray machines, the power does not come off the main hospital supply but has its own mains supply. The boiler is housed in room 6 and it seems from old photographs that this has always been so. One photo taken in 1940 shows a patient being brought in through a door marked 'Wounded and Gassed' and past the boiler. There is an open drainage gully which still runs the length of the inside of the building, from room 5 to 7, close to the outside wall. This was intended to carry off water after 'hosing down' patients caught out in an enemy mustard gas attack. Though dry, this gully has several drainage grilles along its course which take water from the sink and wash basin in the departmental kitchen. The building, being underground, is very susceptible to flooding and these drains can cause most unpleasant problems, with bitter complaints from patients and staff alike. The entrance ramps, whilst being ideal for stretchers and trolleys, act as water chutes during heavy rain and on a number of occasions the staff have stood powerless and Canute-like as cascades of water rippled over the doorsteps, to flood several rooms to an



The main entrance to the Field Hospital in October 2000.
Photo by Nick Catford

uncomfortable depth. The removal of an enormously strong blast wall built to protect the front of the building did not help matters. For many years this doubled as an enclosed rose bed but, due to the fact that it could not be kept tidy and also acted as concealment for vandals, the authorities had it removed. This, at least, used to soak up some of the surplus rainwater during a heavy downpour.

As the reader will no doubt have gathered, this was not a particularly healthy place to work. The kitchen contained the only source of drinking water and during a refurbishment in the kitchen this was inadvertently connected to the hand basin rather than the sink. For years the staff were blissfully unaware that they were drinking highly unsuitable water and what is more, were giving it to the patients. Until September 1967, all the hot water pipes running around each room in the building were insulated with asbestos cladding, which shed dust whenever a pipe was touched or knocked.

During the war years there were separate entrances and departments for men and women. Men entered through one end of the building and women came in at the opposite end. You can see from the plan that each half of the building has an almost identical layout, the partition between rooms 1A and 1B being a modern privacy screen between two X-Ray tables.



During the war men and women had their own entrance at either end of the bunker. Photo by Nick Catford

Nevill Street, Southport – a Christmas puzzle

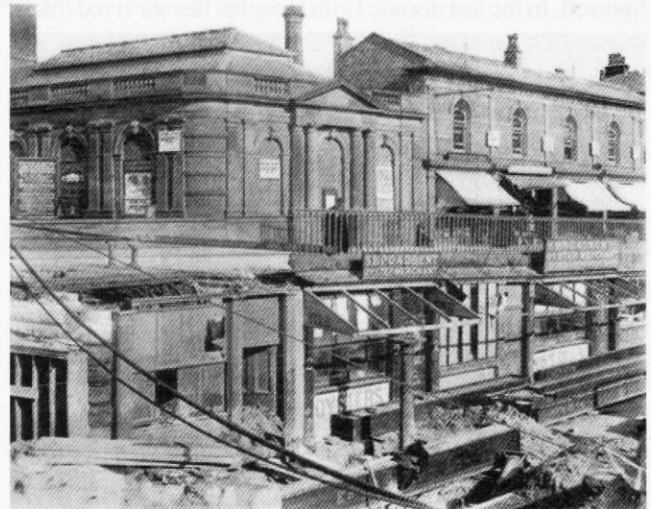
Andrew Smith

A posting on the Sub Brit mail list caught my interest. A now lost underground street in Southport, Merseyside. Could it still be hidden beneath the pavement? What wonders were there left to explore? I was determined to find out.....

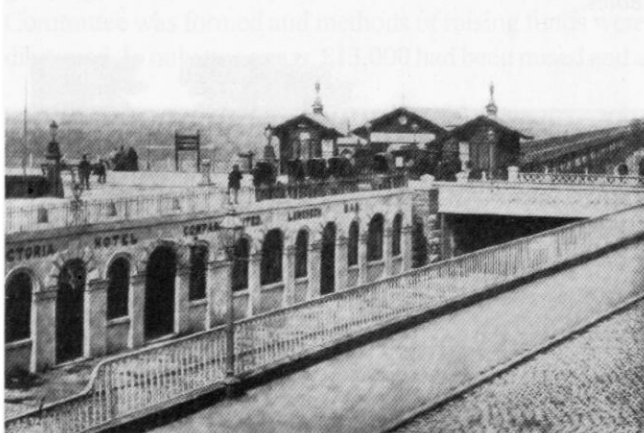
Built in the 1800s, Nevill Street in Southport once opened out onto what was Southport Beach. The street was prone to flooding from the sea during high or surge tides and as the years went by the street was remodelled, finally resulting in the entrance to the beach (the “Nevill Street Bridge”) being closed and filled in. Ultimately, in 1903, Nevill Street was raised to its present level and the former lower-level street was lost under thousands of tons of concrete and sand. There has also been a lot of remodelling of the seafront at Southport over the years with the present beach being over 200 metres from its original position.

So what was the now lost underground street like? Well, it wasn't actually underground! Nevill Street sloped down towards the beach and the street had two levels. The 1890 Southport directory lists four oyster merchants and three confectioners having their premises on Nevill Street. The lower level also had what was the entrance to the Victoria Hotel (now a block of flats), known locally as ‘The Vault’. In 1912 the statue of Queen Victoria was relocated from the Municipal Gardens to Nevill Street although this was moved again along the street itself during renovation works around 2006.

I was intrigued by the story of Nevill Street and started off surfing the internet looking for



The west end of Nevill Street looking inland from the promenade in the early 20th century showing the Victoria Baths and the lower level of shops. This picture was probably taken shortly before the lower level of Nevill Street was infilled in 1903.



The Nevill Street Bridge where the low-level street opened out onto the beach.

background information. It's also useful to have friends in far-flung places and a call to a chum of mine who lives in Southport directed me to the ‘Southport Forum’ website which has an extensive message board for information exchange. I posted a message and within an hour the information began to flow.

It was obvious that there was a lot more to this story than I originally thought and I found myself sifting through old plans, maps, documents and of course, Google Earth to find out more. Phone calls followed and then a real breakthrough. One person who I spoke to said that he knew someone who had shot some video footage within the submerged Nevill Street in the early 1990s whilst renovation work was being carried out. A few phone calls

later and I was talking to the person who had apparently shot the footage. Sadly, this lead proved to be a dead end and the footage he had was of the surface, as opposed to the subterranean area.



The west end of Nevill Street in 2008, from the same viewpoint as the early 20th-century picture. Photo by John Fogg

So having drawn a blank there, it was back to surfing the net for research material and making phone calls to anyone in the area that would talk to me. The internet contained a whole host of information and speculation about Nevill Street but no recent pictures of the subterranean area.

Eventually I decided there was only one thing for it – a trip to Southport beckoned over Christmas. So on 28th December a small but enthusiastic group of Sub Brit members met on Lord Street in Southport and set off for what we do best – exploring.

We knew that some of the existing shops on Nevill Street have evidence of the lower level in their basements so we started the painstaking task of going from building to building, explaining what we were doing and asking the right questions. Just about everyone we met was as helpful as possible and we were set for what looked like an interesting afternoon.

Our first stop was Leo's Bar. Landlord Trevor Ford was out but we were shown into the cellar where there was a window looking out onto a brick wall. The guy showing us around was a former landlord and said that around 15 years ago one of his sons had broken through the wall into an underground chamber but hadn't been able to make any progress to explore further. Having said thanks by buying our host several pints of beer we moved on. Next stop was the Sandgrounder chippy.

Several years ago there was a major fire in this building which was badly damaged and we had received comment previously that an extensive basement area had been seen through the damaged floors. Again we walked in and started chatting to the owner. Within five minutes we were in the basement where we found two bricked-up window recesses facing the same direction as the visible window



The basement of Leo's bar with one of the old shop front windows. Photo by Andrew Smith

in the cellar of Leo's Bar. At this point we realised that we were on to something and that the story had 'legs'. The owner commented that the fire brigade had entered the underground section of the street via Leo's Bar to check if the fire had damaged any of the structure, although having visited Leo's we couldn't see where the access had been made!

The building next to the chippy was another bar but was sadly shut. Originally this was part of the Victoria Leisure Baths which had an extensive basement area which contained a swimming pool. John Fogg had previously explored this basement many years ago and confirmed that whilst the downstairs area extended beyond the building footprint, there was no access to the underground street. We were now at the most westerly end of Nevill Street and looking back towards the town centre we could imagine how the Victorian street looked. Comparing the old photographs from the internet against the current layout we were able to work out where the lower level of shops would have started and where the two levels of the street merged. Also on the internet were pictures of the



The basement of the Sandgrounder chippy showing one of the original windows that that has now been blocked up. Photo by Andrew Smith

resiting of the Queen Victoria statue and pictures of manhole covers with 'underground chamber no. 8' painted next to them in yellow paint. Sadly these manhole covers were removed when the street was remodelled in 2006 and are now buried under some very nice flagstones which sadly hindered our progress.

So we moved on to Hoagey's coffee bar for some refreshment and to explore their basement. This required the owner lifting a large hatch in the floor for us to gain access. We descended the stairs into a large basement which was full of old slot machines and various bits of junk. At the far end of the basement was evidence of a large shop window looking out onto what would have been the lower level of Nevill Street. Here we could clearly see the thick stone window sill still in situ with the glass area again bricked up. The owner said she knew about the street but couldn't tell us anything further about it.

The remaining two shops on Nevill Street were closed so we crossed the road and looked in the underground car park of the block of flats where the Victoria Hotel once stood. Whilst this was at the right depth there was nothing to see so we moved on to the amusement arcade. A chat with the manager revealed that he had a small basement but on exploring this we found it was set back a long way from the road, so couldn't have formed part of what we were looking for. Next we walked around the underside of the pier building and saw two sets of doors positioned where the beach access from the lower level of Nevill Street used to be. These led into a store area for Funland and we were told they once led into the old section of Nevill Street but the access was now sealed up.

So, we had seen windows into what would have been the lower level of the street, chatted to people who knew the street was (or at least had been) there and taken a lot of photographs.



Basement of Hoagey's Coffee Bar showing the remains of the shop front. Photo by Andrew Smith

Having retired to my hotel for the night, the next morning I walked into the offices of the local newspaper the *Southport Visiter* (sic) and asked if they had run any articles recently about Nevill Street or if they had any further information. A short chat with a journalist then led to a longer chat and he started interviewing me about what we were researching. Twenty minutes later we were walking back to Nevill Street with a photographer and the following week Sub Brit was the lead story on the front page, including a rather dodgy picture of yours truly!

Over the next week I had a number of conversations with the journalist who had received numerous calls about the article. A large follow-up article appeared the following week, containing quotes from local pensioners who remembered the cobbled street and exploring by gas lamp, and the local council who said that the street was filled in and there was no access.

Once the dust had settled I continued to search out information on Nevill Street. My letter to Merseyside Fire & Rescue went unanswered but my letter to Sefton Council did get quite a detailed, if somewhat badly spelt response. This stated that Sefton Metropolitan Borough Council took over responsibility for the Nevill Street Bridge in 1986 but no details were passed on from the former Merseyside County Council. However, the council did state that any access would have been lost in 1990 when the initial remodelling was undertaken and the pier forecourt developed.

Sefton Council also stated that it was unwilling to undertake a major excavation scheme as the road has only recently been remodelled and substantial improvements made. The Council added that any voids were presumed filled with local material and whilst there is no evidence of substantial underground passageways existing, there is the possibility that some of the culvert remains, particularly as sewerage works undertaken in 1990 flooded part of the former water storage system in the old Victoria Baths.

So, in summary – yes the underground street once existed and it, or at least part of it, is almost certainly still there. Rumours abound that access is possible from one of the manhole covers in Nevill Street to at least part of the lower level but nothing has been proved.

Maybe Time Team will dig this up in a few years time and the mystery will be revealed. But for now, exactly what is left of the original lower level will remain just that, a mystery.

The Three Tunnels on the former Woodside and South Croydon Railway, London Borough of Croydon

Paul W. SOWAN

In place of London's first and (during its operational use) only tramway tunnel, between Kingsway and the Embankment Greater London now has no fewer than three tram tunnels on the New Addington branch of Croydon's Tramlink. Anyone, on paying the correct fare, can travel through these on New Addington route trams between the Sandilands and Lloyd Park tramstops.

Alert observers will notice that what at first might be taken to be a single long tunnel is in fact three short ones, with two short gaps of three or four metres between them, each admitting daylight. And the first and third (northern and southern) tunnels have a different profile to the central one.

Interestingly, the three tunnels pass through only a single large hill, Park Hill, not three small hills as might be supposed. Examination of the land over the top of the tunnel is enlightening. The north and south tunnels are indeed conventionally bored and brick-lined tunnel, of ovoid profile. However, the central tunnel with a semi-circular profile can be seen to be a cut-and-cover structure running along a deep cutting excavated down from the top of the hill. Access to this curious feature depends on the good will of the rifle club who have their range along the top of the middle tunnel roof.

The Woodside & South Croydon Railway

These three tunnels were built for the remarkably short (a little over three kilometres) Woodside & South Croydon Railway, built jointly in the years 1880 - 1885 by the London, Brighton & South Coast Railway and the South Eastern Railway in one of those periods when these two companies spoke civilly to each other! It took a remarkably long time to make such a short line, despite the contractor, Joseph Firbank, being an experienced and well-regarded railway builder. Firbank, by 1880, had extensive experience of making railway tunnels - at the first Woodhead tunnel (3 miles 22 yards) under the Pennines in 1838 - 45 for example; and Helm tunnel (571 yards) on the Settle & Carlisle Railway in 1870 - 75. However, at the end of his distinguished career, he met his match on the Woodside & South Croydon Railway (WSCR)!

The WSCR line was opened in 1885; it linked the Elmers End to Addiscombe branch of the Mid-Kent Railway which opened in 1864 (and which never went anywhere near mid-Kent!), with the Croydon, Oxted and East Grinstead Railway, opened in 1884. It ran from Woodside Station (on the Mid Kent line) to Selsdon on the COEGR where the station had platforms on both the WSCR and COEGR lines. Woodside station was closed in 1997 (along with the entire Addiscombe branch), by which time

the whole of the WSCR including intermediate stations at Bingham Road and Coombe Road and Selsdon Station had also closed. The former COEGR, now better-known as the Oxted line, has been electrified and remains in use, with trains services between London, East Croydon, and termini at East Grinstead and Uckfield.

The tunnels, their geology, and tunnelling problems

Strictly speaking, in current railway engineering terminology, the Park Hill structure is not a 'tunnel' but a 'covered way.' The difficulty was the creation of a tunnel under Park Hill, which should have been no more than a simple 500 metre bore. However, unlike the Pennines, the rocks of Park Hill include mobile clays, running pebbles, and quicksands - a very challenging tunnelling environment in 1880. There were collapses and landslips, and at times the new railway trackbed (complete with some parked waggons) was heaved upwards by up to two metres!

The centre of the hill was dug out to track level to remove the troublesome strata, and one tunnel became three! At the north end there is the 166 yard Woodside tunnel, a conventional bore through London Clay. In the centre is the 122 yard cut-and-cover Park Hill tunnel, along the floor of the dug out 'crater' in the hill. And at the south end is the 157 yard conventional Coombe Lane tunnel, through Thanet Sand. Passengers on the new trams will notice the two open gaps either end of the central tunnel, the differing tunnel profiles, and some of the concrete retaining walls to keep the remaining ground in place.

The afterlife of the railway

After closure of the railway in WSCR Railway in 1983, there was much interest in the future use of the trackbed and tunnels. A linear park was proposed, as was a nature reserve (in the cuttings at Park Hill where there are badger setts), and conversion to a road. In the event, parts of the line between Elmers End and Coombe Road were used for the two eastern branches of the Croydon Tramlink. It is conceivable that the further stretch southwards from Coombe Road to Selsdon might be used for an extension of Tramlink southwards towards Purley. Although the disused bridge at Coombe Road has been demolished, that over Croham Road still stands, and has recently been repaired.

References

COLQUHOUN, Brian, and Partners, 1983. *Report on the possible use of the Woodside to Selsdon railway line*. London: Brian Colquhoun and Partners for the Department of Transport: vi + 103 pp + folded maps.

A day on the London Underground

Nick Catford

On Saturday 19th January, 22 Sub Brit members went on a fascinating tour of disused stations and other disused areas of the London Underground organised by Sub Brit member Philip Lindhurst.

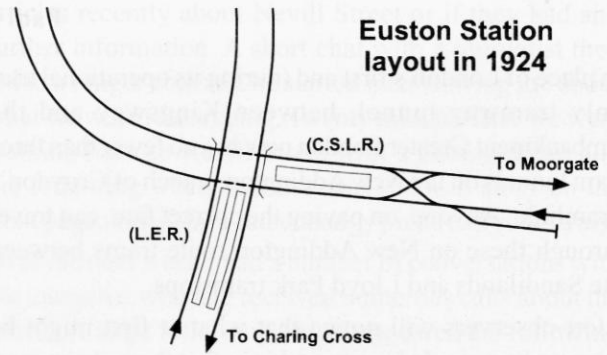
Euston station history

We arrived at Euston underground station at 10 am where we met Station Supervisor Andy Butler who was our guide for the morning. Euston station was opened by the City & South London Railway on 12th May 1907 with the opening of their extension from Moorgate Street. Euston is not to be confused with Euston Square which opened in 1863 as Gower Street on the Metropolitan Railway.



Euston (Seymour Street) c.1907

The entrance building, designed by Sidney Smith, was at the junction of Seymour Street (now Eversholt Street) and Doric Way from where lifts and stairs took passengers down to the west end of the narrow island platform within a large diameter station tunnel; identical to that at Angel. The street level building on Seymour Street was Moroccan

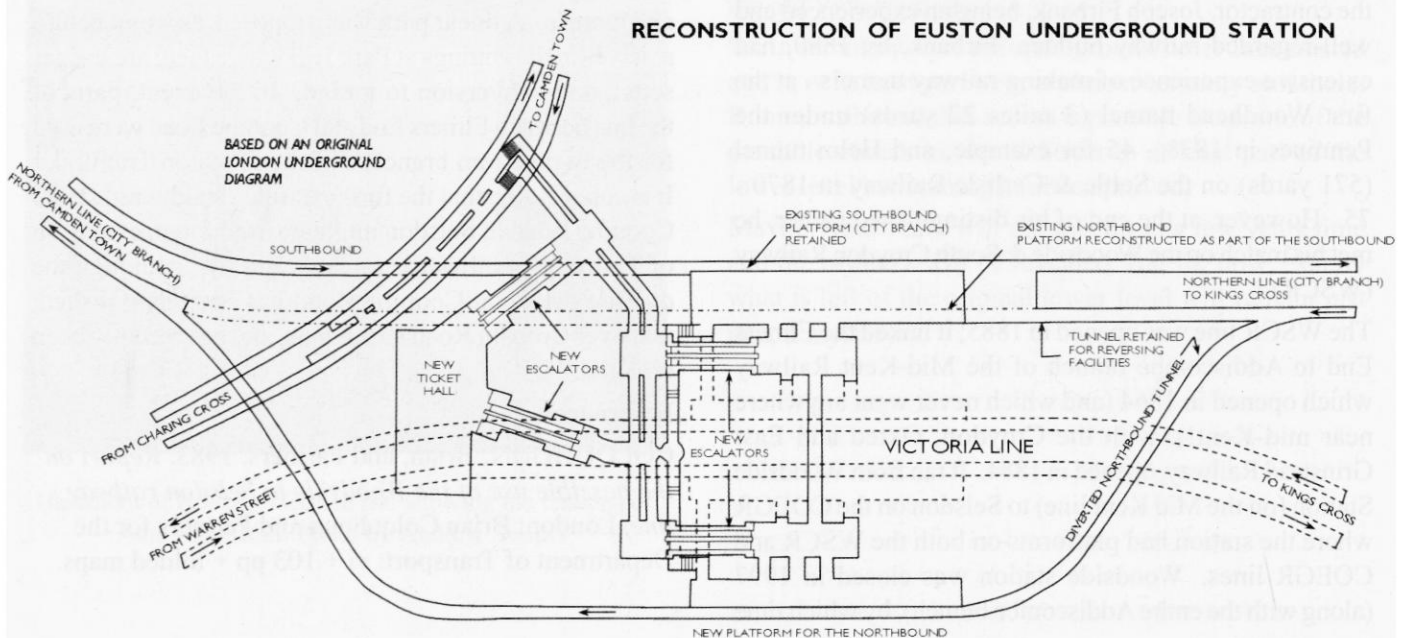


in style faced in white tiles, topped with destination boards with mullioned windows set high in the walls. The building was demolished in 1934 and Euston House, the headquarters of the British Railways Board, now stands on the site.

On 22nd June 1907, the Charing Cross, Euston & Hampstead Railway opened their line between Charing Cross and Golders Green. As planned, the line would have bypassed Euston but the route was later revised to provide an interchange with the mainline station. The station entrance was at the junction of Cardington Street and Drummond Street and was designed by Leslie Green with his characteristic facing of red glazed terracotta tiles.

Although built and initially operated as two separate stations by the two companies, the C&SLR and the CCE&HR platforms were sufficiently close together that a deep level interchange was constructed between platforms shortly after opening. A passage was built from near the C&SLR lifts to the east end of the CCE&HR platforms. At the same time, another subway was built, leading from the connecting passage to a new set of lifts (and emergency stairs) which surfaced within the mainline

RECONSTRUCTION OF EUSTON UNDERGROUND STATION



station itself, a small ticket office was provided on the lower lift landing. Although the companies continued to maintain their own separate entrances and lifts, it soon became clear that maintaining three entrances so close to each other was unnecessary. Both original entrance buildings were closed leaving a single entrance leading down to new sub-surface ticket office below the mainline station; this served both routes.

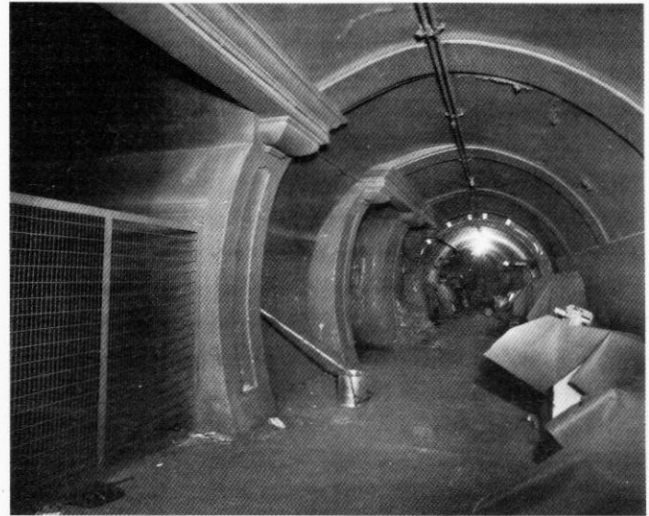
In 1913, both lines came under the joint ownership of the Underground Group. During the early 1920s, a series of works were carried out to connect the C&SLR and CCE&HR tunnels to enable an integrated service to be operated. The first of these new tunnels came into use in 1924 between the C&SLR's Euston station and the CCE&HR's station at Camden Town and both lines eventually became part of the Northern Line in 1937.

In 1967, in line with the opening of the Victoria Line and the rebuilding of Euston mainline station above, the underground station was substantially expanded and remodelled to cope with the increase in passenger numbers. The route of the Victoria Line was designed to provide the maximum number of connections to existing services and to relieve some of the pressure on those other lines by giving an alternative route through central London. As such, interchanges were designed to facilitate quick transfers between lines by the use of cross-platform interchanges where possible. At Euston the single island platform on the Northern Line City (the old City & South London) branch was suffering from dangerous congestion, so a new City branch northbound platform was constructed some way to the south and the old northbound track was removed to provide a wider southbound platform formed by extending the island platform across the northbound running line. The combined entrance subway at the north end of the 'island' was closed with new exits and cross-passages to the southbound Victoria Line being built into the northbound tunnel wall.

Two new platforms for the Victoria Line were excavated between and parallel to the original and the new City branch tunnels to provide cross-platform interchange. A new ticket hall was constructed below the concourse of the mainline station with two sets of escalators replacing the lifts. On 1st December 1969 the whole new interchange system was opened and the old subways were closed off although most were retained for ventilation.

Tour of Euston

To start our tour of the disused passenger subways and lift shafts at Euston we made our way to Platform 1 which is the northbound Northern Line platform for the Edgware branch. At the end of the platform we went through a door and up a short flight of stairs to a short subway that brought us onto the lower lift landing for the Drummond Street entrance. This subway has been disused since about 1913 and is very grimy and the tiled walls are now painted



Lower lift landing for the Drummond Street entrance.

Photo Nick Catford

grey. Alongside the empty lift shafts which are now used for ventilation a third shaft was for the emergency stairs and although these have now been removed and the shaft capped at street level four steel columns that supported the steps still run up the centre of the shaft. There is a new emergency stairway in one of the old lift shafts but we made our way across a metal walkway over the lift well to reach the other side of the lift landing.

From there we went down a steep flight of steps which formed part of the ventilation route for the City Line and is now maintained as a staff walkway between the Charing Cross line platforms and the City line platforms. At the bottom of the stairs was the old northbound City Line which was taken out of service in 1969 when the line was rerouted along what is now known as the Euston Loop (see station layout plan). We were now at the junction of the abandoned alignment and the Euston Loop and we were able to see Edgware-bound trains through a grille. From the junction we walked back along the old running tunnel which, unlike the earlier subway, is clean and well lit.



The old northbound City Line. Photo Nick Catford

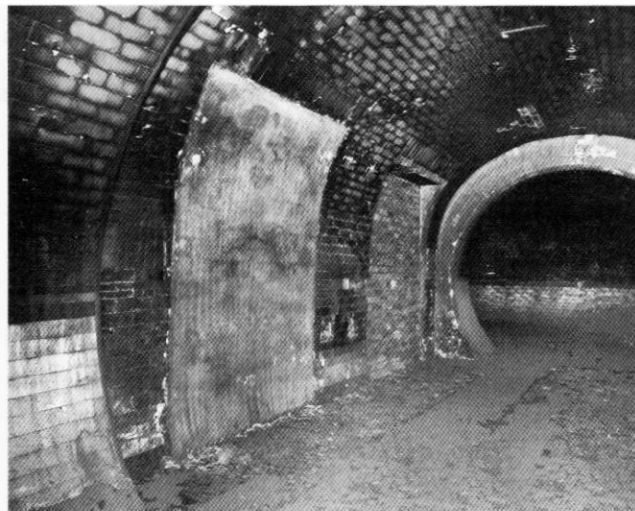
Halfway along the tunnel we went through a door into a room that now houses the new signalling equipment for the Northern Line and then we were back in the old running tunnel again. Eventually we came out through a door onto Platform 6, the southbound platform of the City line. At the far end of the platform we passed through a door and down the ramp passing a stairway up to a signal cabin located above the east end of the old island platform; this closed in 1968. To our right we saw the sand drag at the end of a short section of track which is all that remains of the old northbound City line; a short section of platform edge from the island platform is also visible here.



The east end of the old island platform. Photo Nick Catford

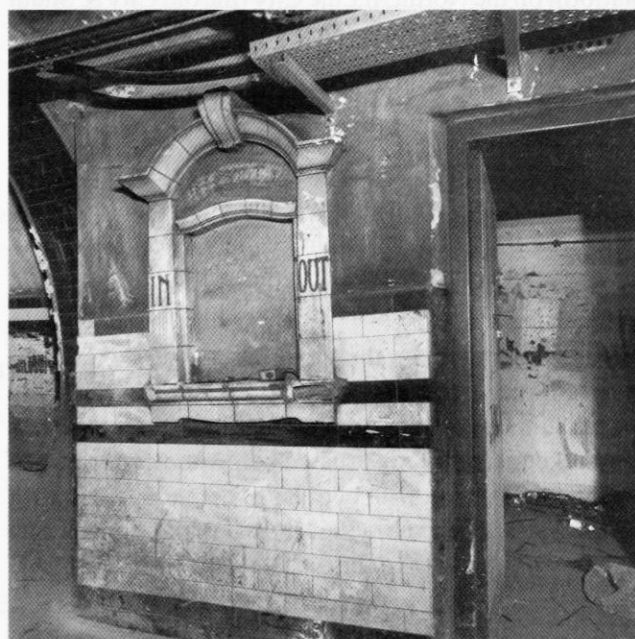
Looking east along the track the southbound city line was to our left with the old northbound City line to the right; this has been retained to allow trains to reverse at Euston. The line leads to the Euston Loop from where there is access onto the Kings Cross loop which is used to transfer trains from the Northern Line onto the Piccadilly Line. A short distance along the old northbound line we could see a disused siding which originally connected to the northbound line just south of a scissors crossover. The 7-car siding was used until 1967 to reverse terminating Euston trains but is now devoid of track although it still retains a hydraulic buffer stop.

We walked back a short distance along Platform 6 and through a door and up a steep and narrow flight of steps that brought us onto the lower lift landing from the original Eversholt Street entrance onto the City & South London line. This has been disused since the early 20th century but there are still some original posters on the wall that are dated 1913. The entrance into the two lift shafts is now bricked up but the narrow shaft for the emergency stairs is still open although all evidence of the stairs has been removed and the shaft is capped at street level. The subway is maintained for ventilation and we could look down onto Platform 6 through a large metal grille.



Lower lift landing for the Seymour Street entrance.
Photo Nick Catford

We descended the steps back onto platform 6 and then went through a metal grille door and up a flight of steps that brought us into a subway. This led to the lower lift landing from the mainline station entrance that replaced Eversholt Street and Drummond Street entrances. This entrance in turn was closed in 1969 when the station was remodelled during the construction of the Victoria Line. There are many 1960s posters remaining along the walls including one detailing the closure of this entrance and the reconstruction of the station. Close to the three lift



The interchange ticket office. Photo Nick Catford

shafts is the small underground ticket office that was provided for interchange between the C & SLR and the CCE & HR; it was closed when the two lines came under joint ownership in 1913. Continuing along the subway there is a flight of steps that led up to Platform 2 on the Charing Cross branch; these have now been bricked up at the top.



Lower lift landing for the mainline station entrance, closed 1968. Photo Nick Catford

Returning back along the corridor to the lifts a further subway leads to another set of steps leading up to Platform 1; these have also been bricked up at the top. One of the lift shafts is still open with daylight visible at the top; the shaft opens onto Platform 2 of the mainline station above. The other two shafts have been bricked up and utilised as equipment rooms.

Returning along the subway from the lower lift landing we entered a ventilation tunnel that took us over the Victoria Line and out into a cross-passage at the base of the emergency stairs. We returned to the surface and made our way across Cardington Street to look at the original Leslie Green entrance building for the Charing Cross platforms. Externally this remains largely unaltered and is used as a fan chamber with a huge upright fan in the centre of the building. A modern iron stairway has been installed in the lift shaft for emergency egress. The ticket office was not in the building but was located below ground; this has now been converted into a sub-station and was not accessible to us.



City Road – 1915

City Road

After two hours exploring the disused parts of Euston Station it was time to leave Andy and catch the Northern Line to Angel Station where we were met by Margaret Rojgubokan, the Group Station Manager from Camden Town, who was to be our guide at City Road and South Kentish Town. City Road was opened on 17th November 1901 when the City & South London Railway extended their service from Moorgate Street to Angel. The entrance was on City Road at its junction with Moorland Street and the main passenger access to the platforms 65 feet below was by two lifts mounted within a single shaft. At track level there were two platforms accessed from the lower lift landing; these were linked by five cross-passages; there was also a signal box.

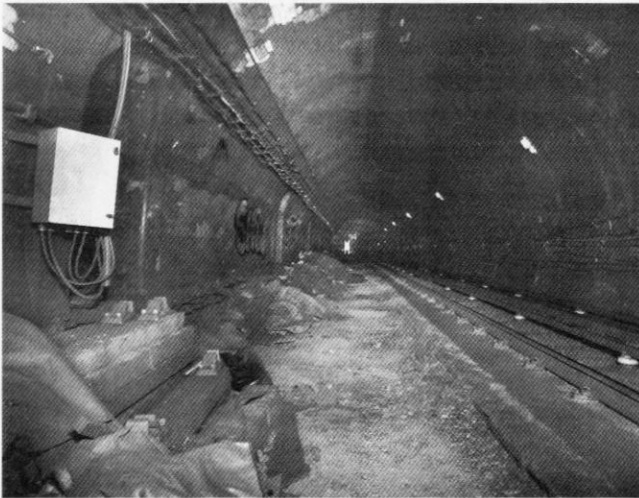


Subway from lower lift landing to the City Road southbound platform. Photo Nick Catford

City Road was located in a rundown area and due to its close proximity to stations at Old Street and Angel it never attracted many passengers. By 1908 closure had already been suggested but the station remained open. On 1st January 1913, the C&SLR became part of the Underground Group of railways and in 1919 powers granted to the C&SLR in 1913 to enlarge the diameter of the tunnels to that of the more recently opened underground lines were renewed by Parliament. Work started on 9th August 1922 and the line between Moorgate Street and Angel was temporarily closed during the reconstruction. The line reopened on 20th April 1924 but City Road remained closed and the platforms were subsequently removed.

Like a number of closed underground stations, City Road was earmarked for conversion into a two-level air raid shelter for 499 people during WW2 but by the time work started on building a six-foot-high brick wall to screen the shelterers from the passing trains the worst of the Blitz was over. The shelter was nearing completion by the end of 1941 with a new stairway in the old lift shaft and toilet cubicles in the passage from the lower lift

landing to the southbound platform. There was a canteen at the north end of the southbound platform area and a first-aid post on the northbound platform. After the war all evidence of the shelter was quickly removed. The street level building remained intact until c.1970 when it was largely demolished leaving a small part of the southern end of the building which now incorporates a ventilation tower. Access to the station is maintained as a means of emergency egress.



Site of the City Road northbound platform.
Photo Nick Catford

Once inside the surface building we followed a narrow curving passage to the upper lift landing where a new spiral staircase descends by 155 steps to the station below. From the bottom landing grimy tiled subways now devoid of posters and signage lead to the north and southbound platforms where the tiled walls can still be seen by observant passengers in passing trains. The original steps down to the two platforms are still in place but as the platforms have been removed new metal steps have been added down to track level to allow passengers to be detained in an emergency. The platform area is now used as a permanent-way maintenance store; it was interesting to note graffiti on the tiled wall of the northbound platform. It seems unlikely that the graffiti artists managed to penetrate that far into the underground system on one of their Christmas Day jaunts from Highgate so it's more likely that this is the work of a bored maintenance worker.

South Kentish Town

Having watched a number of trains go past we retraced our steps up to the surface and made our way back to Angel Station where we caught a train to Kentish Town from where a short walk brought us to the closed station of South Kentish Town located at the junction of Kentish Town Road and Castle Road. South Kentish Town opened with the Charing Cross, Euston & Hampstead Railway on 22nd June 1907. The entrance building was designed by Leslie Green and was similar to the Drummond Street



South Kentish Town - December 1907

building at Euston. From there the main passenger access was by two lifts within a single shaft down to the platforms 50 feet below and there was also an emergency staircase.

The original name for the station was Castle Road and this appeared on several maps prior to opening and on the station tiling. Before the station opened the name was changed to South Kentish Town and a recent investigation showed that paper was stuck over the tiles showing Castle Road and then painted over. The station was never well used and was temporarily closed following unofficial strike action at the Lots Road power station during the afternoon of 5th June 1924, trains having called at the station that morning. Once power was restored it was decided not to reopen Mornington Crescent and South



Lower lift landing at South Kentish Town station.
Photo Nick Catford

Kentish Town. Mornington Crescent was eventually reopened on 2nd July but South Kentish Town remained closed due to the very low number of passengers using it.

As with City Road, South Kentish Town was adapted as an air raid shelter during WW2 and was equipped with bunks and a first-aid post in 1940; these were removed immediately after the war. The platforms have also been

demolished but there is no record of when this happened. There have been several proposals to reopen the station but these have come to nothing and the station is now retained for emergency egress from the Northern Line and as an access point for permanent-way works. The station building has been let to a number of commercial companies over the years and is presently a branch of Cash Converters who have access to the upper lift landing. We accessed the building along a narrow walkway to the rear from where there is a door at the back of the building directly on to a metal spiral staircase. Just outside the



Site of the South Kentish Town northbound platform.
Photo Nick Catford

door there is a room to one side with an old boiler, presumably for heating the station building and at the top of the spiral staircase there is a fireplace set into the wall.

As with City Road, the underground subways are very grimy but the tiling and the entrances to the lifts remain in good condition and largely unaltered although the lifts were removed many years ago. From the lower lift landing there is a short well-lit subway leading to steps down to a cross-passage linking the south end of the northbound platform with a point one third along the southbound platform, the two platforms being partly staggered. This subway is maintained and signed as an emergency escape route should passengers need to be detained at South Kentish Town. From the far side of the lifts a second unlit subway leads to another flight of steps down to a second cross-passage further north along the platforms.

The cream and dark red tiling is clearly visible in the platform area although it has been painted over making it less obvious from a passing train. The platform area is used for the storage of permanent-way materials which are kept under grimy covers. The emergency escape shaft has been capped at street level although a metal column

that supported the steps can still be seen in the shaft and the first few steps at the top also appear to be in place. In one of the lift wells there is access into a low-level passage running beneath the tracks, presumably a cableway or ventilation tunnel; unfortunately there was no way down into the lift well to investigate this. We climbed back up the 97 steps to the surface and made our way back to Kentish Town Station. We thanked Margaret Rojugin for taking us round the two closed stations and caught a train to Embankment where Sub Brit member John Poole, Station Supervisor from Charing Cross was our guide.

Embankment and Charing Cross (sometime Trafalgar Square and Strand)

Embankment station was opened by the Metropolitan District Railway on 30th May 1870 when the railway extended its line from Westminster to Blackfriars. On 10th March 1906, the Baker Street & Waterloo Railway (now the Bakerloo Line) opened with its own deep-level station beneath and at ninety degrees to the platforms of the MDR. On 6th April 1914 the Charing Cross, Euston & Hampstead Railway opened a one-stop extension south from its terminus at Charing Cross. The extension was constructed to give a better interchange between the BS&WR and CCE&HR.

We descended two escalators and a pair of stairs down to the Bakerloo Line platforms and through a door which took us up a wide flight of steps and then right into a long former passenger subway now known as Pages Walk. This linked the Circle/District Line platforms with the Bakerloo Line platforms and was closed to passengers on 2nd March 1914 but has been retained as a cable way and for communications equipment. Much of the original tiling is still in place. At its far end the subway opens out into a huge chamber excavated by cut and cover below Villiers Street. This housed the Embankment substation



Embankment former substation.
Photo Nick Catford

which fed the underground with traction current; it closed in 1957 when it was replaced by a new substation located between Embankment station and Victoria Embankment Gardens. The massive chamber is now devoid of any equipment but retains an overhead gantry and pulleys for moving heavy machinery around. We were able to go down a flight of steps onto the floor of the substation where some electrical switchgear is still in place. A ventilation shaft for the substation can be seen in Victoria Embankment Gardens.

From the substation we climbed a ladder that brought us out onto the eastbound District Line platform from where we made our way back to the surface and walked up Villiers Street to Charing Cross station, our final visit of the day. The Northern Line and Bakerloo Line parts of Charing Cross were originally opened as two separate stations but were combined when the Jubilee Line was opened. The Bakerloo Line platforms were opened as 'Trafalgar Square' by the Baker Street & Waterloo Railway on 10th March 1906. The Northern Line platforms were opened as 'Charing Cross' by the Charing Cross, Euston & Hampstead Railway on 22nd June 1907 and formed the southern terminus of the line.

Initially there was no direct connection below ground and passengers interchanging between the lines had to do so via two sets of lifts and a surface walk. In an effort to improve passenger interchange, the CCE&HR was extended in 1914 the short distance south under Charing Cross mainline station to connect with the BS&WR and the District Railway at Embankment station.

From 6th April 1914, the original CCE&HR terminus was renamed 'Charing Cross (Strand)' and the new station and the BS&WR station to the south of the main line station was named 'Charing Cross (Embankment)'. These names lasted only a short time; on 9th May 1915, Charing Cross (Strand) was renamed 'Strand' and Charing Cross (Embankment) reverted to its earlier BS&WR name of 'Embankment'. At the same time, the separate Strand station on the Piccadilly Line was also renamed 'Aldwych' to avoid confusion.

The Northern Line's Strand station was closed on 4th June 1973 to enable the construction of the new Jubilee Line platforms. These platforms were constructed between the Bakerloo Line and Northern Line platforms and for the first time an underground interchange between the two stations was provided. The Jubilee Line platforms and the refurbished Northern Line platforms opened on 1st May 1979. From this date, the combined station including Trafalgar Square was named Charing Cross.

Although Charing Cross was constructed as the southern terminus of the Jubilee Line, plans already existed to continue the line to the east towards Lewisham. The tunnels were, therefore, constructed beyond the station

beneath Strand, almost as far as Aldwych station which would have been the next stop on the line. The subsequent regeneration of the London Docklands during the 1980s and 1990s required additional transport infrastructure and the eventual line of the extension took a different route branching south from the original alignment beyond Green

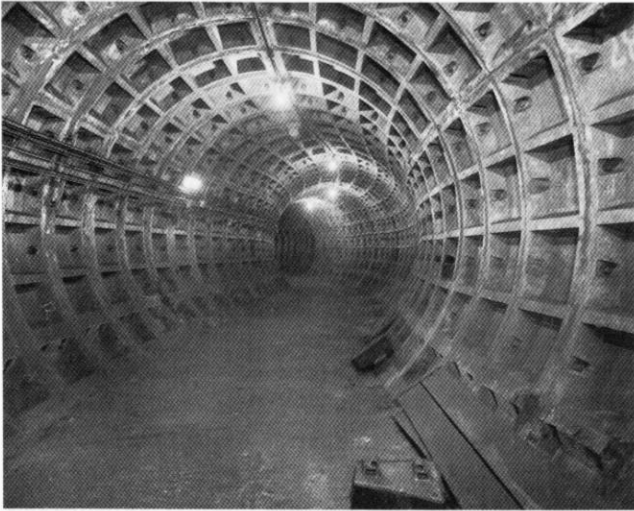


An empty Jubilee Line train reversing in the old station at Charing Cross.
Photo Nick Catford

Park to provide new interchanges at Westminster running via Waterloo, London Bridge and Greenwich to terminate at Stratford. On the opening of the first section of the line between Green Park and Waterloo stations on 20th November 1999, the Jubilee Line platforms at Charing Cross were closed to passengers after just over 20 years' use.

The Jubilee Line platforms are still maintained by Transport for London for use by film and television makers needing a modern Underground station location while Aldwych is retained for period dramas. The station is also used for reversing trains in an emergency and on the day we visited, the Jubilee Line was closed between Green Park and Stratford for engineering work so all Jubilee Line trains were running into Charing Cross to reverse while passengers had to leave the trains at Green Park. None of the escalators at Charing Cross are in working order so the station can't be used for passengers. Charing Cross was completely different to the other disused stations that we visited during the day; they were all dark and grubby while Charing Cross was clean and well lit and with trains running into the station every six minutes it could still have been open; had there been any passengers! We were also able to see a suite of domestic rooms and offices accessed from one of the platforms which are still used by contractors and TfL staff.

After a long climb back up one of the stationary escalators we went along the subway linking the Northern Line and



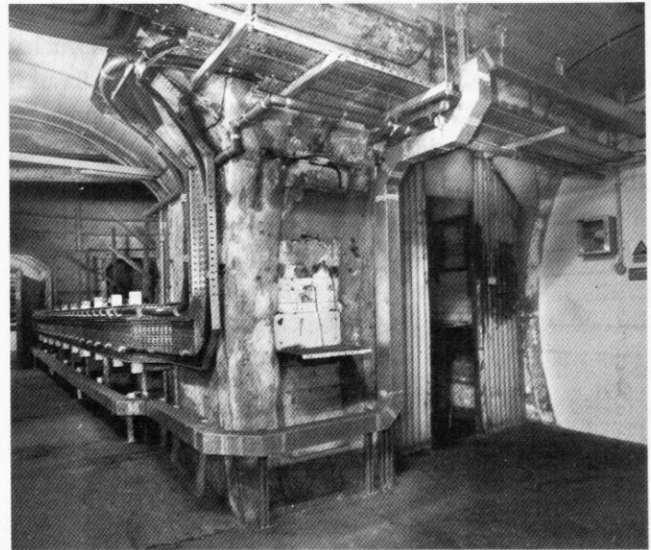
Contractors tunnel at Charing Cross, excavated during the construction of the Jubilee Line.
Photo Nick Catford

Bakerloo Line platforms. This was built during the construction of the Victoria Line and was never intended for passenger use but once it had been built it was decided to let the public use it. From this subway we went through a stainless-steel grille door into a long well-lit tunnel. This was also excavated during the construction of the Jubilee Line and slopes down towards it. After about 200 yards there is a right angle bend to the left; this point is almost under the fourth plinth at Trafalgar Square. The tunnel used to continue straight ahead with a narrow-gauge tramway taking spoil out to a work site where the Sainsbury Wing of the National Gallery is now located; this tunnel has now been sealed. A stack of corrugated stainless steel panels from the tunnel roof of the Jubilee Line platforms is stored here; these were removed owing to water leakage problems causing damage to the platform cladding. Turning sharply to the left we passed through some signal equipment rooms to a 30' vertical ladder known as 'Jacobs Ladder', which provides a fire escape from these rooms to the bottom of Escalator No. 1. The fitter members of the party climbed the ladder and out through another metal grille back into the public subway while the remainder of the party retraced their steps along the long tunnel.

From the main access subway to the Northern Line, a door took us into a ventilation tunnel leading to the Craven Street shaft. The shaft was sunk in c.1973 to provide draught relief and ventilation to the Northern and Jubilee Line platforms and the substation at Charing Cross. It is about 60 metres in depth and about 7 metres diameter.

To complete our tour of Charing Cross we entered the exit subway from the original lifts at Trafalgar Square Station comprising four lifts in two shafts plus a spiral staircase. The lifts date from the opening of the station on the 10th March 1906; they were replaced by escalators

on the 13th April 1926. The first lift shaft has a walkway over the open well which gives access to the entry side of the lower lift landing. The second shaft now contains a fan for ventilating the Bakerloo Line. The third shaft contained the spiral stairs. These were removed some time ago as they were structurally unsafe and the shaft now provides the air intake for the adjacent fan. At the bottom of these shafts are two small sumps to provide drainage for any ground water that accumulates.



Disused lower lift landing for Trafalgar Square station.
Photo Nick Catford

We had started at Euston at 10 am, and finished at Charing Cross at 7 pm. It was a very long and tiring day but everyone who came said how much they enjoyed it and would not have missed it and we were all looking forward to Philip's next underground excursion (this has already happened – Ed).

I would like to thank Philip Lindhurst for making the day possible; special thanks also to Andy Butler, the Station Supervisor at Euston; Margaret Rojugin, the Group Station Manager from Camden Town for the trip round City Road and South Kentish Town and last but not least to John Poole, the Station Supervisor from Charing Cross who took us round Embankment and Charing Cross.

Editor's Note: This was not an official Sub Brit trip. It was a private visit organised by Sub Brit member Philip Lindhurst and advertised on the members' e-mail list.

Sources:

Philip Lindhurst, Andy Butler and John Poole

Abandoned Stations of London's Underground
by J.E.Connor – Connor & Butler 2000
ISBN 0 946699 30 9

Wikipedia – the free online encyclopedia

Northern Line Disused Features (web site)

www.pendar.pwp.blueyonder.co.uk/Tube/RaggaJohn.html

Dudley Canal Tunnels and the People's £50M Lottery

History of Dudley Canal Tunnel System

Vic Smallshire

The canal from Birmingham to Wolverhampton was opened in 1771. Keen to take full advantage of this new & revolutionary means of transport, Lord Dudley constructed a private branch canal about half a mile long off the Birmingham canal at Tipton. Initially built to serve his lime kilns, between 1775 and 1778 he extended his canal through a 200yd tunnel directly into his limestone mines within Dudley Castle Hill. No Act of Parliament was required for this branch canal and tunnel because they were constructed entirely on His Lordship's considerable estate. Previously limestone had been wound up shafts in small quantities and transported to the customer by horse and cart. Now a boat with a capacity of 25 tons could be introduced into the mine within yards of where the limestone was being won. That same boat, powered by one horse, could then be taken directly to the end user. This was usually an iron works where the limestone was used as a flux - an essential ingredient in the iron-making process.

In 1785 the Dudley and Stourbridge Canal Companies were looking to make a connection with the Birmingham Canal. Whichever route was taken, a long tunnel would be required to pass through the ridge that forms the Severn Trent watershed through the Black Country. An obvious solution was to extend the tunnel that their principal shareholder, Lord Dudley, had already driven into his mines at Tipton. In 1785 an Act was obtained authorising the construction of a tunnel from the existing tunnel within Dudley Castle Hill, to the existing terminus of the Dudley Canal at Blowers Green about two miles to the southwest. The extension tunnel was 3,154 yards long followed by a flight of five locks descending to the former terminal basin of the Dudley Canal.

After many changes of engineer and contractor with all the usual trials and tribulations associated with tunnel

construction, the tunnel was completed in 1792, after a construction period of seven years. The tunnel, being only about eight feet wide, had no passing places, and boats were allowed through in convoys for four hours before the tunnel was cleared and the direction changed for the next four hours. Boats were propelled by men lying on their backs and pushing against the tunnel walls with their feet - a practice known as legging. Typically it would have taken about two hours to leg a loaded boat through the tunnel. The new tunnel together with the Dudley Canal as far as Black Delph, followed by the Stourbridge Canal to Stourton Junction, formed a link with the Staffordshire & Worcestershire Canal. This new link cut about two days off the journey via Wolverhampton for Black Country minerals and goods heading for the River Severn. At this time, this was also the route to London via the recently opened Thames & Severn Canal. There was no direct canal route to London until the completion of all the canals that now form the Grand Union Canal.

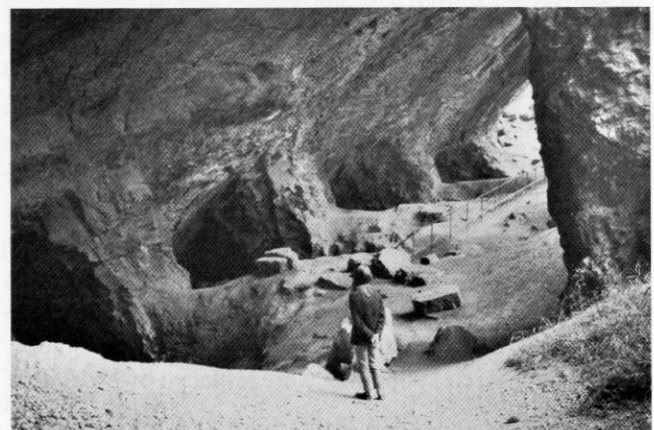
In spite of its small bore and laborious method of propulsion the tunnel was an immediate success resulting in boats having to queue several days for a passage. It is recorded that in 1841 over 41,000 boats passed through the tunnel. From Castle Mill Basin, the "commodious basin" formed to accommodate the junction between Lord Dudley's original tunnel and the new tunnel, a short branch canal was driven south following the strike of the lower, thick bed, limestone on the east side of Castle Hill. A much longer underground canal was driven along the strike of the thick bed limestone on the west side of Castle Hill from a junction within the "new" canal tunnel. This in turn had a branch to mines in the thin bed and a second branch to pierce the anticline to intersect the same beds of limestone on the east side of the hill.

The Wrens Nest Tunnel

Towards the end of the 18th century the mines of Castle Hill were facing exhaustion so Lord Dudley turned his attention to the geologically identical Wrens Nest Hill about half a mile to the west. A new tunnel was driven from Castle Mill



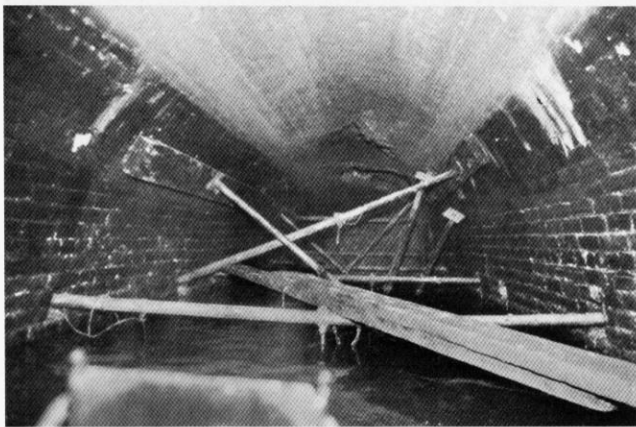
The lower gallery of Dark Cavern, Castle Hill in 1986, looking north in the thick bed limestone. The canal runs along the footwall of the mine. The Dark Cavern has now been filled with sand. Photo by Nick Catford



Wrens Nest West 'Thick Bed' workings, prior to infilling.

Basin westwards for a total distance of 1227 yards. Like the Castle Hill anticline, the axis of the Wrens Nest anticline ran in a north-south direction. Therefore this westerly orientated tunnel intersected the two beds of limestone on the west side of Wrens Nest Hill where the strata dips to the east at 87°. The tunnel continued through the centre of the anticline to intersect the same beds of limestone on the other side of the hill where the strata dips to the west at 45°. Where the tunnel intersected the beds of limestone on each side of the hill the tunnel was widened to form a loading basin about 300 feet long by 30 feet wide. Each basin could accommodate 12 narrowboats of 70 ft long by 7 ft beam, each with a capacity of about 25 tons.

The limestone was worked north and south along the strike from the intersection of the seams with the canal. The resultant mines created spectacular galleries on many levels over a large area. The mines were finally abandoned in the 1920s but remained accessible to intrepid explorers until the



Accro Props supporting a failing length of tunnel, now collapsed. The Tunnel was kept open for a water supply for the Wrens Nest mines infilling operation in the 1970s.

1960s. On the east side of the hill all that now remains is a very large cavern in the thin bed on the south side of the canal. The remaining mines have been filled in. On the west

side of the hill, where the mines were much more extensive, the lower levels were filled with sand in the 1970s and the upper levels with crushed dolerite in the 1990s. In the first case the infilling was to protect a nearby housing estate that was showing signs of stress following a misguided scheme to get rid of "the limestone mine problem" by blowing out some of the supporting pillars in the 1960s!

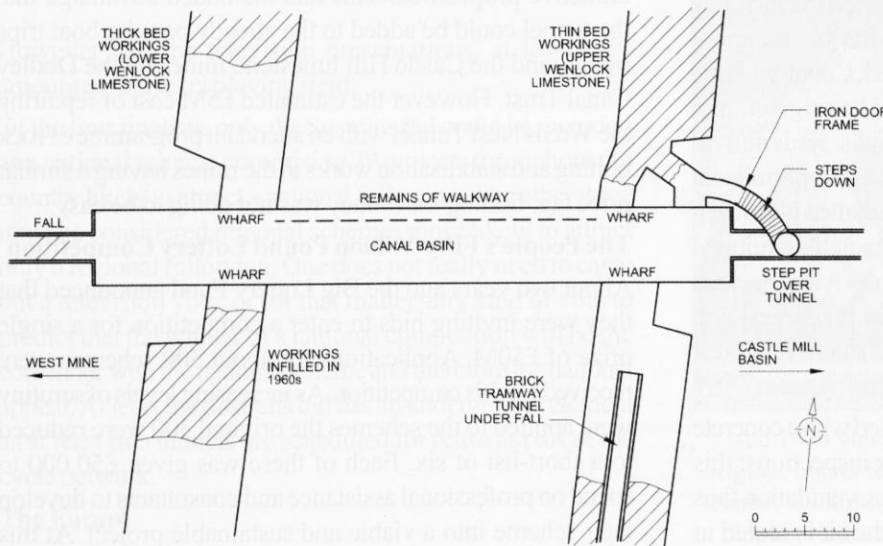
In the 1990s the remaining parts of the mine, which by now were being appreciated for their importance in mining history and for the geological exposures they revealed, were filled to arrest continuing deterioration. Dolerite was chosen as the infill material because it was so geologically different from limestone that it would not be confused with the native strata if the mines were restored at some time in the future. There was the added bonus that those who excavated the dolerite would find a ready market for it as road stone.

The Wrens Nest Canal Tunnel survived intact, probably until the 1930s when a large council housing estate was build on the land between Castle Hill and Wrens Nest Hill.

During this process one of the four construction shafts was discovered and unceremoniously filled in. As one of those intrepid explorers of the 60s I had the privilege of navigating



Looking down the reopened 'Step Pit'.



**WRENS NEST EAST MINE
APRIL 1998**

Drawn by Tim Robinson

up to this in-filled shaft from both directions. However, even in those far-off days there were sections of tunnel lining with ominous bulges. Both ends of the tunnel are in sound limestone strata. Near the centre of the tunnel the much softer, coal measure strata dips down to intersect the tunnel. Not only is this strata comparatively weak but in the Black Country any coal seams would have been worked causing damage to any nearby structures. There is evidence that a coal seam was even worked from the tunnel construction shafts. Eventually significant lengths of the tunnel within the coal measures collapsed.

At its greatest extent, after the completion of further private canal tunnels within the twin anticlines of Castle Hill and the tunnel to Wrens Nest Hill in 1805, the underground canal system, on the 473ft Wolverhampton level of the canal system, intersected two beds of limestone eight times. This is a form of horizon mining, originally developed for the Duke of Bridgewater's underground canal system at Worsley, near Manchester, and later employed in many large coal mines around the world in the late 20th century. This highly



Looking south in the Wrens Nest East with 'Thin Bed' limestone workings. This is the mine destined to be reopened. In this photograph the canal tunnel is behind the camera; there is an upper gallery extending over the canal tunnel. For scale the limestone bed is 28 ft thick and dips at 87° to the east.

efficient modern mining system owes its existence to its canal-related predecessor of over two hundred years ago.

One of the construction shafts for the Wrens Nest Tunnel was furnished with a cast-iron spiral staircase as a means of access for the miners to get to work. This shaft although vertically above the canal tunnel was sealed from it by the continuous tunnel lining. At the bottom, a short flight of steps led to a short tunnel connecting with the eastern loading basin. A few years ago Dudley Metropolitan Borough Council, aware of the existence of the mines but unable to gain access to assess their condition, reopened the in-filled, 150ft deep "step shaft". In so doing parts of the spiral staircase were recovered and sent to the Black Country Living Museum where they remain in storage. The original, part unlined and part brick-lined, shaft was widened to accommodate a new concrete segment lining. A permanent set of ladders and ventilation ducting was installed with room for a small two-man cage wound by a specially equipped man riding crane. Having examined the mines it was decided that every effort should be made to retain the largest and most spectacular of the mines and to reopen the Wrens Nest Canal Tunnel.

The "step shaft" is normally fenced and sealed with a concrete slab. It is only opened every few years for inspections; this exercise involves the hire of a suitable crane, ventilation fans and other specialist equipment. Because the air is sealed in the mines when the "step shaft" is closed, the mines are force ventilated for several days before personnel are allowed to enter. This is because gas detectors indicate continuing



Looking north from the same camera position as picture to the left. The lower opening leads down to the canal tunnel. The upper opening extends over the canal tunnel. The mound of spoil in the foreground is to be removed.

oxygen depletion which it is believed is caused by the corrosion of scaffolding walkways installed to facilitate the inspections. With each inspection of the mines using the "step shaft" for access costing about £100,000, the prospect of opening the Wrens Nest Canal Tunnel was getting to be an attractive proposition. This had the added advantage that the tunnel could be added to the already popular boat trips run around the Castle Hill limestone mines by the Dudley Canal Trust. However the estimated £5M cost of repairing the Wrens Nest Tunnel with an attendant programme of rock bolting and stabilisation works in the mines having a similar price tag, finding the money was not going to be easy.

The People's Fifty Million Pound Lottery Competition

About two years ago the Big Lottery Fund announced that they were inviting bids to enter a competition for a single prize of £50M. Applications for about 300 schemes were received for this competition. As increasing levels of scrutiny were applied to the schemes the original 300 were reduced to a short-list of six. Each of these was given £50,000 to spend on professional assistance and consultants to develop their scheme into a viable and sustainable project. At this point I must point out that the Wrens Nest scheme was part of a much larger set of schemes promoted by a consortium of the four Black County Boroughs of Dudley, Sandwell,

Walsall and Wolverhampton under the banner of the Black Country Urban Park. After this stage two schemes fell by the wayside leaving four finalists to go forward to a television vote in December 2007.

The four finalists and the votes cast were:

	Votes	% vote
Sustrans	119,348	42%
Black Country	83,556	29%
Sherwood Forest	48,822	17%
Eden Project	34,559	12%
Total	286,285	

What stands out from these figures is that the Black Country came second from an original roll call of 300 and polled as many votes as the Eden Project and Sherwood Forest put together. Not bad given that most people in the country will have heard of the other two but have little idea of what the Black Country is or even where it is. Without wishing to sound like a bad loser I have to say that the television vote was a travesty. Each contestant had a 15-minute programme after the 11 o'clock news on ITV. Each programme contained a 10-minute promotional film that in each case was appalling, and so far as I could see was specifically designed to miss the point.



A recent view of the Wrens Nest tunnel portal in Castle Mill Basin.

However bad the television presentations, at least they amounted to a level playing field.

Of the four finalists, only the Sustrans bid could be regarded as a national scheme comprising 79 projects throughout the country likely to attract a national following. The other three must be considered regional schemes more likely to attract only a regional following. One does not really need to carry out a television vote, or for that matter, any kind of vote to predict that the winner of a national competition will be the contender with the national scheme and therefore the national appeal. At least the Sustrans bid has an underground element as at least two tunnels are scheduled for reuse as part of the cycle network.

The Future

The announcement of the result was universally greeted with dismay and disappointment that within 30 seconds had turned into defiance. This is the Black Country and we are going to

do it anyway. It has been discovered that there is a requirement for lottery funds to be distributed reasonably equally throughout the country. One estimate shows the Black Country is around £90M down the field. On this basis we expect to get a fair crack of the whip when applying for lottery money through other routes. So, Mr Lottery fund distributor, who cares about the £50M? Just slip us the £90M you owe us and we'll say no more about it!

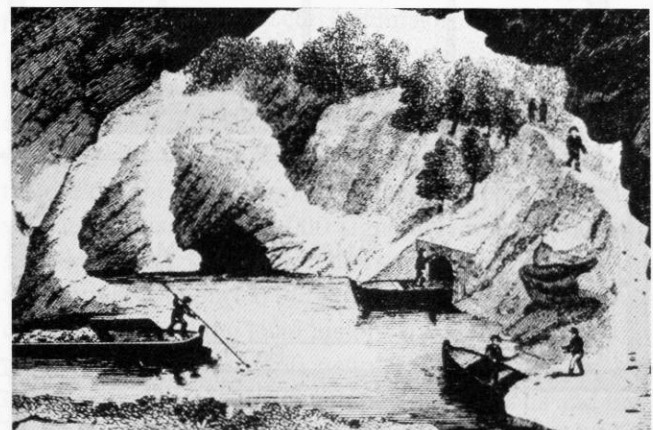
Plan "B" is already in action. The team at Dudley intend to press on with reopening the Wrens Nest Tunnel and are putting their bid together based on the immense amount of work already done. We in the Dudley Canal Trust are busy working with our friends at Dudley putting together a bid for much improved visitor handling facilities that will be needed when the Wrens Nest Tunnel opens. It won't happen so quickly and it might not have all the frills that the original scheme had but there is a determination that it will happen. Finally, can I thank all the Sub Brit members who voted for us. Getting second place means that we have to be taken seriously. It's now up to us to make sure that we are.

Watch this space!

The Dudley Canal Trust saved the whole Dudley Canal and Tunnel from oblivion in the 1970s in the face of stiff opposition. To justify the continued existence of the tunnel, and to make money for its maintenance, trips were started to allow the public to see what had been saved. In the 1980s the Trust was successful in getting grants to drive new tunnels to reconnect the Castle Hill limestone mines.

Currently the Trust runs 'turn up & go' trips every day around the limestone mines. Trips are also run on the first Sunday of every month all the way through Dudley Tunnel, including return transport. Bookings for organised parties are taken at any time and you can even get married in one of the limestone mines. Sub Brit had an extensive 'through trip' through the tunnels as part of the 2002 study weekend.

Details from the Dudley Canal Trust Office on 01384 236275 or www.dudleycanaltrust.org.uk



A c.1850 view of Castle Mill Basin. On the left, The original tunnel to the Birmingham Canal at Tipton; left of centre, a short tunnel into the thick bed limestone mines, dipping to the east; right of centre, the 3,154 yard long Dudley Canal Tunnel. There is also with a branch into the 'Thick Bed' limestone mines dipping to the west. On the right is the Wrens Nest Tunnel.

Communal air raid shelter in East Sheen under threat

Nick Catford

A large communal air raid shelter at East Sheen in southwest London is under threat from developers who are hoping to turn it into a pair of underground one-bedroom apartments.

St. Leonards Court, a three-storey block of flats at the junction of St. Leonard's Road and Palmers Road, East Sheen, SW14, was built in the mid-1930s. With the outbreak of war in 1939, a large communal air raid shelter was built for the residents on open ground in front of the flats; it was completed in about 1940.

The shelter is semi-sunken, approximately two-thirds below ground and one-third above ground. The whole was then covered by an earth mound and grassed over making a raised garden in front of St. Leonards Court. The entrance to the shelter is through a small circular brick building with a conical tiled roof, resembling a dovecote, from where steps lead down to the spine corridor running through the centre of the building. Clothes

hooks are provided at the bottom of the stairs with more hooks at the far end of the corridor.

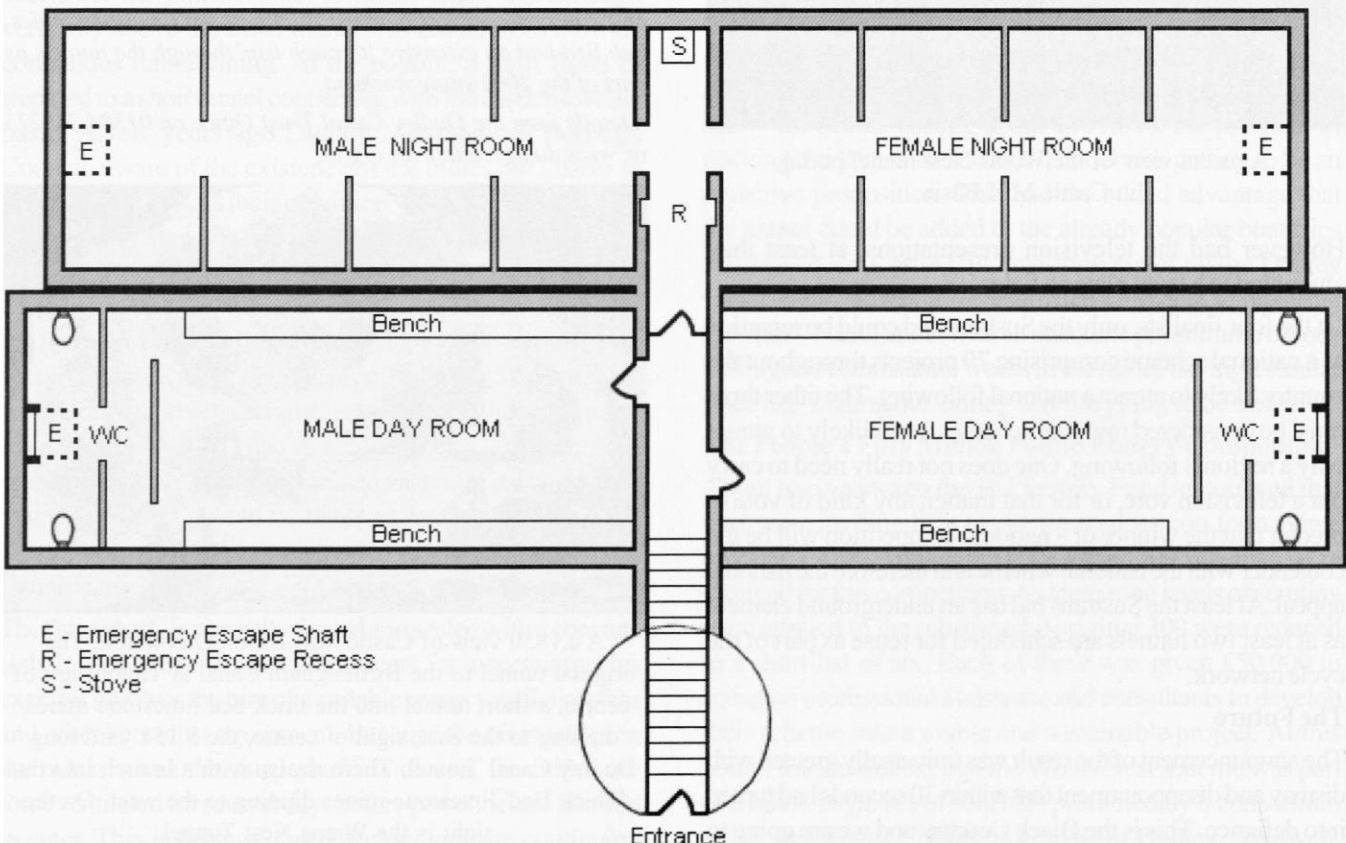
The shelter had a theoretical capacity of 70 people, roughly half the number of residents of St. Leonards Court and it's suggested that there was a week-on/week-off arrangement. The shelter has four large rooms, two of



The ladies day room with two chemical toilet recesses and an emergency exit shaft at the far end.

Photo by Nick Catford

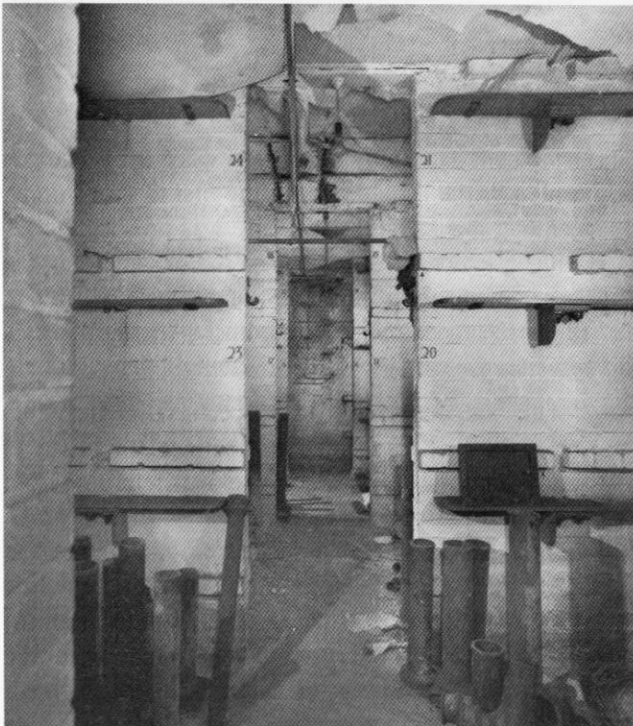
which are 'day' rooms, one for men and one for women, on either side of the spine corridor. The day rooms have wooden benches resting on brick supports along both long walls and at the far end of the room a brick wall with two toilet recesses behind it, each still retaining their Elsan chemical toilets. The words 'Ladies' and 'Gents'



E - Emergency Escape Shaft
R - Emergency Escape Recess
S - Stove

are painted on the white brick walls. Between the two recesses a steel ladder leads up to an emergency escape hatch in the ceiling.

Beyond the day rooms there are two 'night rooms', again ladies to the right and gents to the left. The night rooms have been divided into eight bays, four either side of a central corridor. Each bay had three bunks mounted one above the other where wooden planks would have been placed across bricks protruding from the partition walls: a total of 48 bunks in the shelter. Each bunk has a wooden shelf with its own light and light switch and the bunks are all numbered and provided with numbered clothes hooks on the end of the bay walls. At the rear of the night rooms there are two further escape hatches this time



The ladies night room divided into eight bays. Each bay had three numbered bunks with an individual shelf, light and clothes hook (all visible in this picture).

Photo by Nick Catford

accessed by step irons in the end walls. The ceilings in the night rooms are approximately 2 feet higher than the day rooms to accommodate the triple bunks with correspondingly less earth cover above them.

At the end of the main spine corridor a cast-iron stove is still in place which would have provided heating for the shelter; electrical switchgear is also located here.

The shelter is clean and dry and in good condition. All the internal walls are white and much of the woodwork, including the benches and shelves, is painted green; all the paintwork is original. At present, the shelter is partly used for storage by the caretaker of St. Leonards Court. It has an electricity supply and all the rooms are lit.

There is a wooden door in the spine corridor between the day rooms and the night rooms and two low recesses in the wall between the spine corridor and the night rooms. At the back of these recesses there is only one course of bricks and it has been suggested that these would have provided another emergency escape route if the door and emergency escape shaft in that room had been blocked during an air attack. It should be possible to 'kick out' the single course of bricks to escape from the room.

Nearly all the flats in St. Leonards Court have been sold leasehold and the freeholder now wants to convert the shelter into two underground one bedroom flats, with a sunken patio area for each flat. Although the flats themselves would be underground, the roof would be well above ground and the area fenced and hedged off. The outer walls of the shelter would become the outer walls of the flats. The end result would be the effective destruction of the shelter and also the destruction of the centre of the St. Leonards Court front garden.

Residents and neighbours have lodged objections to the proposals on the grounds that they would lose their lawn and rose garden which makes up two-thirds of the area in front of the flats. Perhaps more importantly a valuable local historical asset would also be lost. Although the shelter is not unique it is a very good example of its type, remaining largely unaltered since WW2 and still retaining most of its original features and fittings. A similar shelter exists close to Deanhill on Upper Richmond Road opposite the junction with Clifford Avenue but when last inspected this shelter was flooded to a depth of two feet. The Deanhill shelter is owned by the same freeholder. It is thought that a third similar shelter was built for the Courtlands Estate in Sheen Road but this was destroyed during an air raid in WW2 with considerable loss of life.

The residents believe that the shelter would be better used as an educational resource for school parties to visit as part of the school history curriculum now includes WW2. Three local schools have already expressed interest in using the shelter for educational purposes and two local charities are prepared to contribute to funding towards the renovation of the shelter. A campaign to retain and restore the shelter is supported by many local residents who have raised over 1,000 signatures in a petition to save the shelter. Local councillors and the local MP have also actively supported the campaign and both the local civic society and the local history society have pledged their support. About 100 people have written to the Council to object to the development proposals and the local press, the *London Evening Standard* and BBC Radio London have also carried stories about the campaign.

The local council has refused planning permission for the proposed development and there will be a public hearing on 1st May 2008 to hear the appeal to the Planning Inspectorate.

Coober Pedy, South Australia - "Opal Capital of the World"

Stewart Wild

Coober Pedy is an extraordinary, dusty mining town 530 miles north of Adelaide and 430 miles south of Alice Springs. It lies in the middle of a vast desert area, and its nearest township of any note is more than 150 miles away. It is located on the northern edge of the Woomera Prohibited Area that extends some 340 miles from east to west and around 200 miles from north to south, that's around 68,000 sq miles or an area larger than England and Wales added together. The Stuart Highway, which runs from Darwin to Adelaide, a distance of almost 1,900 miles, with tarmac all the way, crosses this Prohibited Area, and one is warned not to stray more than 100 metres either side of the road - they say it's because of the possibility of unexploded ordnance.

I reached Coober Pedy from Adelaide, and decided to fly rather than take the bus, partly because the bus schedules were inconvenient and partly because I wanted to see the desert from the air. There's only one service, by Regional Air Express aka Rex Air, which operates from Adelaide one daily flight using 19-seater Metropolitan or slightly larger Saab aircraft. One flies over a vast terrain of desert and dry salt lakes, and as you near Coober Pedy the view changes to a moonscape scarred by mining, with vast multicoloured heaps of spoil and heavy machinery looking like black insects. You arrive at a tiny airport, the main facilities of which are a hut, a fence and a tree.

The town has a population of around 3,500 and is the source of 85 percent of the world's opals. It's a rough and ready, wild-west type of town, attracting miners and prospectors from all over the world, but especially from eastern Europe and China. They say more than 45 nationalities are represented. Almost everything except the bus station and the petrol pumps, the hospital and the school, is underground, including several hotels, restaurants and five churches. There's even an underground pottery. The school, incidentally, which has around 400 pupils, possesses the only patch of grass in town apart from the obligatory (Australian rules) football oval. Sixty per cent of the housing is underground, most of the surface housing being occupied in the winter only or by Aborigines who can better stand the heat and don't like being underground anyway. House prices vary from A\$15,000 to \$120,000 above the ground and A\$20,000 to \$200,000 underground. So for the equivalent of around £80,000 sterling you could buy a very comfortable four-bedroom troglodyte dwelling in this part of the world.



Spoil heaps in the opal fields. Photo Martin Dixon.

The settlement dates only from 1915 when a 14-year-old boy named Willie Hutchison was the first to spot shining opals among the dirt and rocks. He was prospecting for gold with his father and three other men. For some years the area was known only as the Stuart Range Opal Field, but in 1920 it was renamed Coober Pedy, from the Aboriginal words *kupa* (white man) and *piti* (hole or waterhole).

News of the find soon spread and prospectors began arriving, spurred by the opening of the trans-continental Railway in 1917 and their numbers swollen by soldiers returning from World War I. These guys knew a thing or two about trenches and mining, and realised that the best way to counter the dust storms and searing summer temperatures (35 to 47°C, or 95 to 120°F) was to live in tunnels that they called dugouts; these soon became underground dwellings. Average temperature year-round is a pleasant 28°C (although there can be frost in winter) and average annual rainfall is a mere 110 to 125mm - that's about 4 to 5 inches.

I stayed at the Comfort Inn Experience Motel which I had chosen because its sixteen rooms are entirely underground. It occupies the site of the first mine in 1918. My room was huge, with three beds, TV, a bathroom, kitchen sink and stove, in fact, everything except windows! I should perhaps explain that in Coober Pedy 'underground' housing doesn't usually mean 'downwards' but more 'sideways', cutting into the side of a hill. You often see chimney pots poking out from someone's "roof", providing ventilation and smoke exits from kitchen stoves.

OPAL

Opal is a precious stone and a form of silica. It was known in Roman times and Shakespeare called it the "queen of gems". It is mined from 3 to 30 metres down on an ancient sandstone seabed formed between 70 and 150 million years ago. It comes in several varieties: opaque, milk-white, red, yellow, blue and green, and lustrous. The brilliance is caused by the diffraction of light set up by the layers of silica crystals. Much rarer are black opals. All varieties are found at Coober Pedy and can be bought inexpensively in any one of more than thirty underground shops.

I went for a walk and came across the local scrapyards. The variety and size of discarded rusty equipment was amazing. In the cemetery, grave markers may be seen in all shapes, sizes and languages, and one in particular was unusual in that a German miner had stipulated that his headstone was to be an aluminium keg of beer and that the only decoration was to be beer bottles! Apparently the incumbent knew he was seriously ill and held his wake early so he could join in the fun.

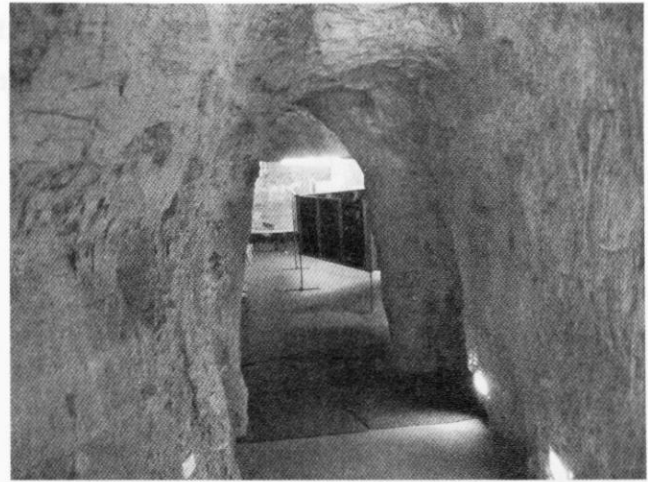
Then I went to church, to an underground Serbian Orthodox church to be exact, the only one of its kind in the world. It's dug into a low hill with a cross on the top. Inside it's beautiful, just like a normal church in size and lacking nothing except windows.

Alongside the roads there were warning signs since the whole town sits on a honeycomb of mineshafts and tunnels. The golf course has eighteen holes, and no grass. Water is of course scarce here, and costs around A\$3 per 1000 litres (220 gallons); that's four times the price of water in Adelaide and twice what we pay in London. The water comes from a deep artesian well 23kms away and also from a reverse-osmosis desalination plant installed in 1985. The few trees are kept alive using recycled water.

The following day I joined a tour of some private residences, always called 'dugouts'. This was fascinating. Residents who were away were happy to leave their keys with the tour guide so visitors could see what underground living was like.

The tour then took us out of town, to an area about 30km north called the Breakaways Reserve. On the way along red dirt roads, we saw huge holes in the ground, spoil heaps and huge pieces of equipment like nothing I had ever seen before. Shafts are never backfilled so there's real danger everywhere.

The Breakaways Reserve is half an hour north of Coober Pedy and is protected with national park status. The area is full of eroded multicoloured rocks and ridges, with formations called Castle, and Salt and Pepper. These formations are



Passage to Sunday School in Underground Church.
Photo Martin Dixon.

sacred to the Aborigines and climbing is discouraged. It's good hiking territory and several movies have been made here, including *Mad Max Beyond Thunderdome* (1985) with Mel Gibson and Tina Turner; *Ground Zero* (1987), a political thriller; *The Adventures of Priscilla, Queen of the Desert* (1994) about Drag Queens playing a desert gig; and *Red Planet* (2000), about astronauts landing on Mars. Many fossils of sea animals have been found in this area. The South Australia Museum in Adelaide has a first-rate collection of these including many in pure opal.

When I got back to my hotel, I noticed that next to the lobby was another doorway. This explained why the hotel had no bar, for I discovered that the hotel is owned by evangelical born-again Christians. They had converted one of the original mine shafts into an underground chapel for their "Revival Fellowship", although this was unfortunately closed as it had received divine intervention and been flooded after heavy rain. The following morning I said farewell to Coober Pedy and went to the bus station to catch my Greyhound bus for the seven-hour run to Alice Springs. It felt good to have explored in such an exceptional location.

STAKING A CLAIM

Mining is all done by individuals or partnerships – there are no big companies here. The result of this is that statistics of yield and income are impossible to come by. For A\$46, that's around £20, any prospector can apply for a permit. This gets you four I D tags which you affix on posts to the four corners of your plot. Plots are 50m x 50m or 50m x 100m. You pay extra for a licence giving you the right to mine that plot for fourteen days, three months or one year as you require. I was told that nowadays there are only about forty full-time miners and about two hundred part-time. Many licence holders live elsewhere most of the time and employ someone to do their mining for them. To avoid the daytime heat, mining is often done at night using ultra-violet light.

The mass of waste material is known as mullock and picking it over for opals is known as "noodling". Some locals, and even some tourists, make a living from noodling on abandoned spoil heaps where a permit is not required. You can get round the need for a surface licence by expanding underground. One hotelier who enlarged his property by digging out ten more rooms apparently found opals worth a million dollars, giving the phrase "self-financing" a new meaning!

Opal Prospecting in Coober Pedy Today

Martin Dixon

Having staked – quite literally – a claim, the challenge of locating and extracting opal has only just begun. Unlike many minerals, opal does not predictably appear in well ordered veins. Finding the opal beds is so hit and miss that all opal extraction is officially termed ‘prospecting’ rather than mining. Key to finding the opal is the location of underground slopes or ‘slides’ which concentrated the flow of silica into pockets during the formation of the opals 150 million years ago. The opal deposits are usually associated with gypsum (calcium sulphate) in its satin spar form – chemically and visually identical to that mined at Kirkby Thore in Cumbria. The deposits can appear in horizontal levels or, equally commonly, dipping ‘verticals’.



Entrance to original 1920s dugout. Photo Martin Dixon.

Where the opal deposits are shallow, open-cast extraction can be used. Large bulldozers dig down, with visual examination of the revealed strata being mainly used to locate opals. Open-cast accounts for less than 10% of extraction and of these sites a small percentage use so-called ‘noodling machines’. These feed the spoil via conveyers through a darkened chamber lit by UV light where one or more operators out-sort any opal material which glows under the light.

Prospecting on the remaining 90% of sites usually starts with the boring of a nine-inch (diameter) hole using a vehicle-mounted auger. This is most extensively used for prospecting shallower than 10 metres. Deeper than this, the auger has to be removed and extensions fitted which adds to the time and cost. If the auger reveals potential opal-bearing layers then the next step is to drill a one-metre diameter shaft.

For this a Calweld drill is used. These drills have integrated buckets above the drill head which are used to collect the extracted spoil. Disposal is achieved by



Radiating passages in an opal mine. Photo Martin Dixon.

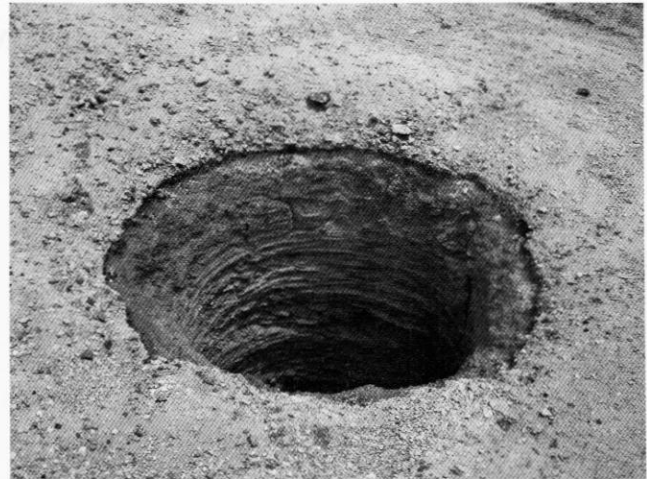
removing the drill, moving it laterally three or four metres and dumping the spoil through flaps. Much of this shaft drilling is done by subcontract and a 20-metre shaft might take three hours to complete at a cost of perhaps 300 Australian dollars (say £150). Having sunk the shaft, prospectors then slowly descend into it in order to assess the ground. To do this an electric winch (‘Yorke hoist’) mounted on the back of a pick-up truck (‘Ute’) is used to lower a bosun’s chair. Ladders are primarily used for emergency exit. If considered worthwhile, the shaft is backfilled to the level of any promising slides or gypsum bands. At this stage the shaft is usually widened to two metres, in order to be able to lower machinery, and a second escape shaft is also drilled. Over the score or so opal fields surrounding Coober Pedy, it is estimated that upwards of one and a half million shafts exist. It is not for nothing that signs on the fields advise against walking backwards!

In about 50% of cases a tunnel-boring machine is then used to construct galleries radiating from the shaft. The tunnelling machine is directly attached by metal tubing to a surface ‘blower’ – effectively a huge vacuum cleaner. This is used to extract spoil which is periodically dumped from a holding hopper. Any opal beds actually uncovered are hand extracted using a pick and shovel. Where tunnelling machines are not used then traditional drill and blast technology is used. Patterns of holes in a working face are filled with newspaper ‘sausages’ of ANFO explosive and associated detonators and priming cord. Fuse wires of about one metre (100 seconds burning time) are lit and a hasty retreat beaten to the surface using the Yorke Hoist. A careful count is made of the explosions heard (a nine-hole pattern is common) to ensure all charges have successfully gone off. The capital investment needed for explosive exploration is very small so still popular

with 'casual' prospectors. Once a claim has lapsed then it can be taken up by someone else so it is very common for existing mines to be re-excavated by others.

Many opportunities exist for visitors to see the surface portion of the opal fields and a few underground sites are also accessible. A character known as Crocodile Harry (allegedly the inspiration for Crocodile Dundee) hand dug a mine next to his dugout and both can be visited. A few years ago a hand-dug mine dating from 1916 was rediscovered while extending an underground home. Known as the 'Old Timer's' Mine, this too can be visited. The Umoona (underground) Museum also links in to a disused mine which has authentic but recreated displays. Many of the town's underground hotels were once mines but most original traces have been lost in conversion.

One working mine that can be viewed is Old Tom's mine on the southwest outskirts of Coober Pedy. Originally dug from the surface as described above, a drift entrance has now been added to ease access for tourists. A full range of mining equipment is on site and is operated during visitor tours (1-3 times daily, depending on demand). 'Old Tom' was the original owner of the mine and unusually the site operates on a longterm lease rather than the usual annual-claim basis.



Opal Mine Shaft. Photo Martin Dixon.

Most tours in the area also offer the opportunity to 'noodle' for opals on spoil heaps in search of a fortune. Some stamina is needed, however, to do this in a shade temperature of 42° C while being besieged by thousands of flies. Retreat to an underground bar at a constant 24° C is a far more refreshing alternative.

Local Legends

Progress Report John Burgess

I have continued my investigation and research into the legends of the Lymington 'smugglers' tunnels. Through personal contacts and introductions, I have approached both residents and shopkeepers in the High Street. Still, people assure me that there really are miles of tunnels from one end of the town to the other. I fear I may have to disappoint them! On the other hand, I may be the one proved wrong and find a labyrinth of passages, which would be fantastic - if they existed. Watch this space!

A recently published book: Lymington An Illustrated History, by Jude James, published by the Dovecote Press, contains the following brief comment: 'There are tales of underground passages in Lymington being used to secrete smuggled goods. Of course, there are no verifiable records to substantiate these legends but as Lymington men were engaged in the trade they would have used whatever hiding places were at hand.'

Old SB hands will also remember a presentation by one of our members, Simon Walker, on Underground Hitchin and the splendid book with the same title he wrote and published himself eight years ago. Again, this work was inspired by all the tales of tunnels between various locations within the town.

I am now making appointments for more lengthy visits, together with a fellow member of Subterranea Britannica,

in order to survey the subterranean features in more detail. So far I have been able to arrange access to seven more over the coming few weeks. One of the more important places to explore is the local Church and I have already had a preliminary chat to the vicar who, like everyone else, has been enthusiastic and extremely helpful. My conversation with the Curator of the local museum was likewise very constructive and interesting.

Already, I have briefly visited some High Street cellars, one having medieval stone foundations, a well and a bricked up arch into the next house - which is next on the list to visit! Another, whilst old, was unfortunately plastered and the floor was covered. What I am looking for is any signs of a level below the normal cellars.

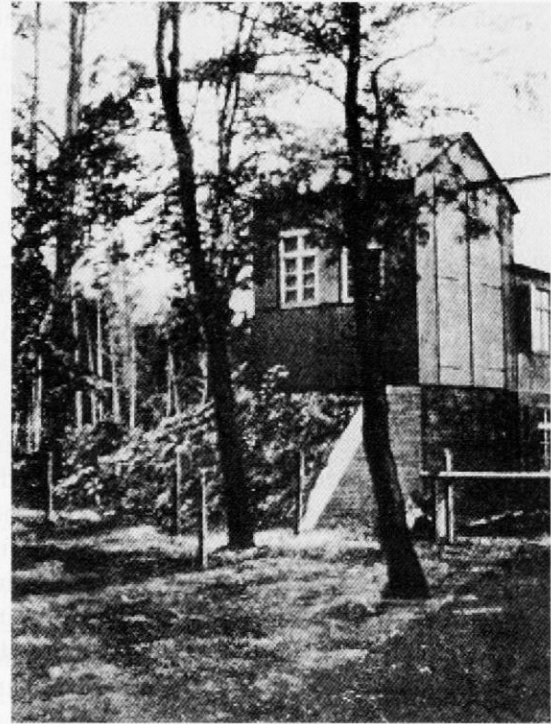
There is actually one plausible tunnel in town. This was a service tunnel that ran below the High Street to link the cellars of the two coaching inns on either side. The inn on the South side has been converted into shops and unfortunately the cellar filled with concrete. The other below The Angel Inn is still intact.

Following my first article, I am pleased to report that one member has started researching a missing tunnel that he remembered hearing about many years ago and others are looking into their own local legends. We will try and include some of these research results and findings in future articles.

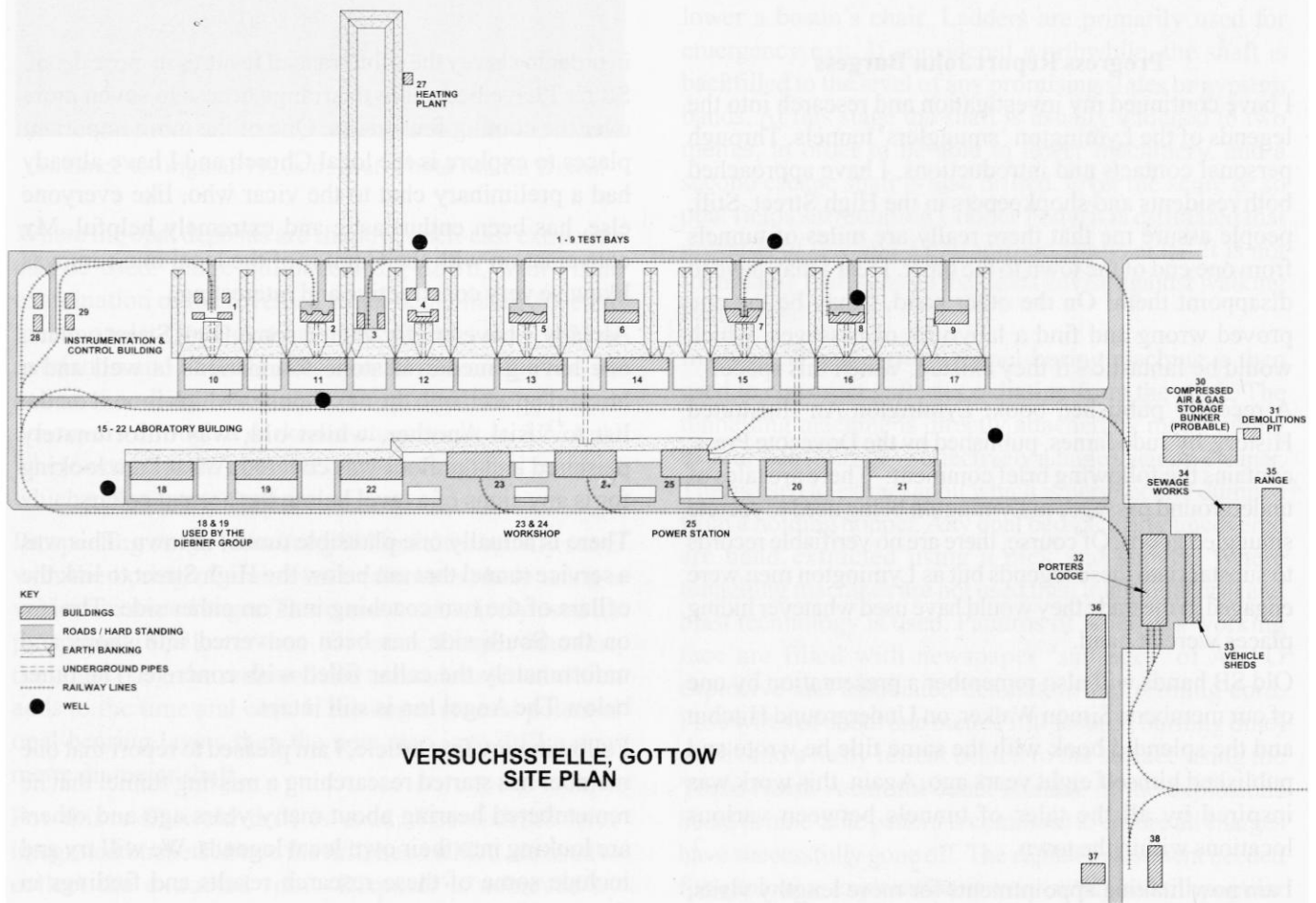
Gottow and Juterbog, September 2007

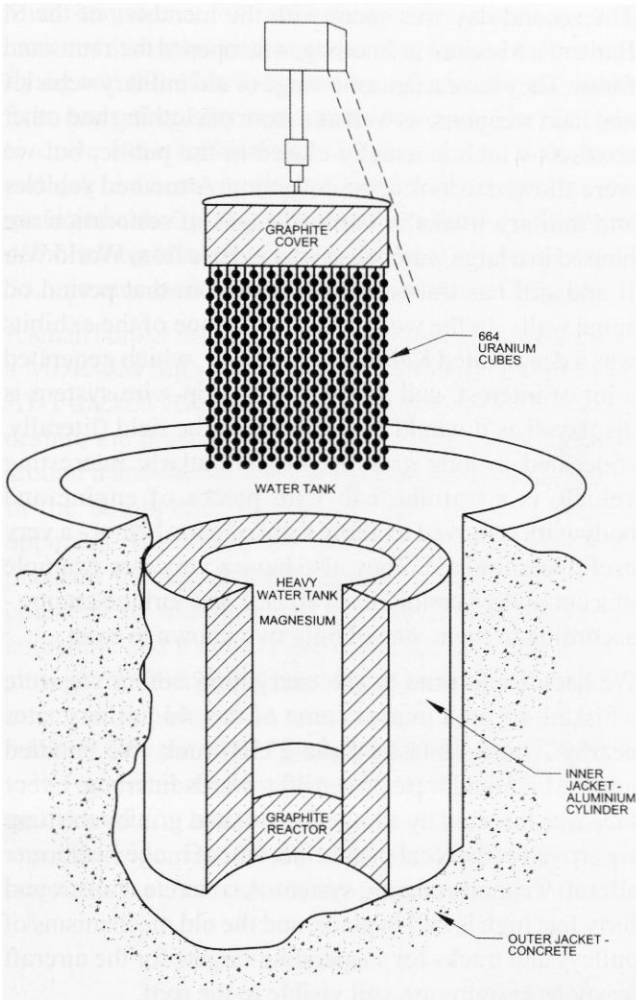
Jane McGregor

In November 2006 Mike Barton, Robin Ware and I visited Gottow, in the former East Germany near Juterbog. Like many sites, this was an old World War II site which was later taken over and reused by the Soviet Army during the Cold War. It is adjacent to two former firing ranges. The public are not allowed on the site, not least because of the very real danger of unexploded munitions, but we were given permission to access the site for the day. Needless to say, the site was too interesting for a single visit, and so Mike made arrangements for a larger group to come over and explore, again with proper permission. Hence the fourteen Sub Britters in the minibus on 22nd September 2007. Unusually, we had hired a driver as well, so everyone could doze or gaze excitedly at the abandoned military buildings of Juterbog as we went by. Then we arrived at Gottow and were given some information on the site by Mike, who has been doing his own research here, and by some of our German hosts led by Manfred and Helmut. Mike supplied us with his own notes and site plans, which was very kind and enabled people to find their way to points of interest under their own steam.



The disused nuclear reactor in Soviet days (source unknown).





The remains of the nuclear reactor in 2007.
Photo by Nick Catford.

The original site was used for the testing of various weapons and formed an early part of Wernher von Braun's V-weapons research. It was also the site of a small-scale, experimental nuclear reactor. However, the documents and information pertaining to the site ended up in the Soviet Union and very little is now known about each individual building and exactly what sort of experiments were conducted here. After hearing a little of the site history, most people made a bee-line for the reactor vessel,

which is just outside the main site behind the Soviet garages. Signs in the forest warn of the presence of unexploded munitions.

The experimental atomic pile was primitive, and so was the containment building. This comprised a square concrete pit with a wooden, shed-like structure bolted onto the top without an upper concrete shield. A circular graphite ring was placed in the pit, which was partly filled with heavy water (deuterium), and an assembly of uranium cubes was lowered in. Nickel balls containing radium were added as an accelerant. Both the graphite and heavy water would act as neutron moderators; it is unclear what, if anything, was used for control rods. The reactor is said to have maintained criticality for around eight hours before xenon gas, a by-product of the fission process, damped down the reaction. The suspended core was then removed - a dangerous operation.

The lower part of the reactor vessel is still extant, a little way off from the main site in the woods.

The structure resembles a small reservoir, and consists of a square concrete pit surrounded by earth banks. Small steel girders which probably supported the wooden superstructure are still in place, as are metal studs along the tops of the walls. A staple ladder is set into the northern wall leading down into the bottom. Some members took the opportunity to climb into the pit. There are no visible runs for pipes or other services, but these may have been contained in the wooden upper floor or be buried in the sludge at the bottom of the pit.

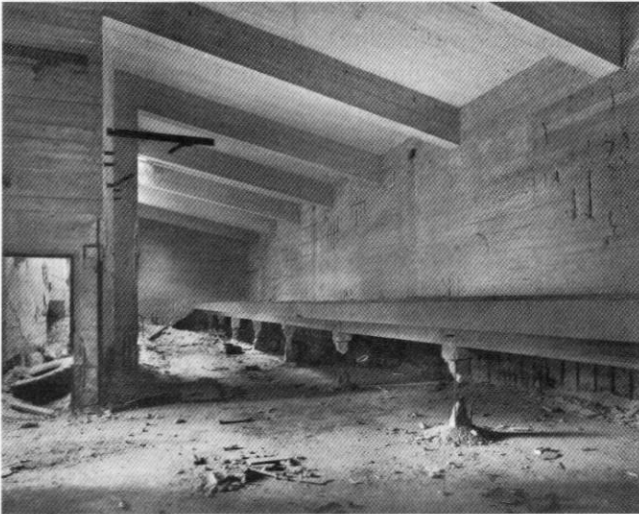
The Soviet buildings at Gottow are built of the usual white brick, and the guardhouses have unusual ornamentation, with castle-like roofs. There are several large warehouse-type stores along the southern edge of the site. Some have the remains of the doors across the front and all have a loading bay running along the front. These were probably used for ammunition.

One of the main features of the site is the group of test bays built for testing of experimental weapons including the V-weapons project. These test bays are mostly around



One of the experimental weapons test bays.
Photo by Nick Catford

twelve feet high and are slightly similar to the structures on Orford Ness and at Waltham Abbey Gunpowder Mills, both of which have been visited by Sub Brit in recent years. They are arranged along the northern road and are built in pairs. The first set at the east of the site has a water channel running to a large open reservoir, which looks as though it may be a catchment system for a cooling water spray, perhaps to protect the concrete wall of the test cell itself. Tunnels lead back from observation areas behind each cell. All of the test cells have holes in the concrete walls, most of which are blanked off and appear to be for inserting pipes, wires or probing instruments. No two sets of cells are exactly alike. Some are surrounded by earth banks, one has an observation window. There is a small concrete building nearby with two small rooms; this appears to be some kind of shelter - possibly for use during a dangerous test, again a feature seen at sites with similar histories such as Orford Ness and Spadeadam. A square concrete reservoir is in the line of cells; it is almost identical to the reactor vessel except that it has no means of getting in or out - it may have been for water storage but there are no visible pipes. Alternatively it may be the concrete remains of a double-walled storage container for something dodgy!



The 'underground' railway station. Photo by Nick Catford.

There is a small service area between the test cells and the other storage buildings. A narrow railway once ran into a station here; only a cutting remains on the surface but the partly underground station is still there. It has the appearance of a loading area. Plant rooms lead off to the left of the station, with traces of machine beds and exhaust extraction for generators and cable fixings on the walls. These areas have been partially destroyed but a good deal still remains. There is a Soviet-built fire training tower off to the edge of the site, used for training and for hose-drying. Its upper storeys are made from wooden planks resting on a metal frame. The wood is now very decayed and the tower is unsafe. After a long day with plenty of exploration time, we arrived at our Juterbog hotel in time for a leisurely beer before dinner.

The second day was spent with the members of the St Barbara's Museum in Juterbog, who opened their museum for us. They have a fantastic range of old military vehicles and inert weapons, as well as a store of clothing and other artefacts which is usually closed to the public, but we were allowed to look at the collection. Armoured vehicles and military trucks in various stages of restoration are housed in a large warehouse which dates from World War II and still has traces of paintings from that period on some walls. In the weaponry display one of the exhibits was a deactivated Kalashnikov AK-47, which generated a lot of interest, and a rather nasty trip-wire system is displayed as it would be deployed in the field (literally, concealed in long grass). One particularly interesting vehicle is a training cab with pieces of engine and bodywork removed to allow sight of parts below - a very useful learning aid. They also have a very rare example of a cut-away version of a T80 tank gas turbine engine - according to them, one of only two known to exist.

We hadn't had time to see everything before we were whisked off on a tour of some of the old military sites nearby... in a fantastic Kraz 255B truck. We bundled into the back and were driven off towards Juterbog. Every face was bisected by a huge fly-studded grin by the time we arrived at the local pistol club, whose range is a former aircraft weapons ranging system. A concrete wall around forty feet high is still in place, and the old mechanisms of pulleys and tracks for suspending targets for the aircraft weapons systems are still visible in the roof.



Sub Brit members aboard the Kraz 255B truck at the St Barbara's Museum. Photo by Mike Barton

We were soon back on the truck and off to two nearby bunkers. These are privately owned and not accessible, but we were able to photograph the outside. There was then a short drive to the go-kart track on the old airfield nearby, to look at the small bunkers there. Once this was done, it was Top Gear time. There was a lovely flat road across the old airfield... which our driver promptly ignored and drove over the surrounding rough ground instead!

Much amusement followed when we drove up to an earth bank and straight over the top, sending the less sure-footed flying and therefore followed by undignified extraction from each other once back on the flat level. The idea was to drive back to Juterbog across country, but a new padlock had been placed on a barrier half-way along the route and although our vehicle was more than capable of demolishing it this would not have gone down too well. So, one nine-point turn later, it was back to the road.

A small bunker nearby houses some more of the collection: a MDK-2M high-speed ditching machine, based on an AT-T tracked vehicle chassis and undeniably impressive despite the pigeons and dust. The bunker has foxholes around it and the museum has erected Soviet pictograms in the compound, instructing how to bayonet your opponent. Eventually we were called away for a very pleasant barbeque lunch complete with vodka toast, courtesy of Manfred and our hosts. This was very enjoyable and it could have come dangerously close to sitting around drinking beer, but were we by any chance interested in going into a nearby underground air-defence bunker? Cue the whole group marching across the field to the amusement of the other diners. The bunker was in good condition and very dry, and we had a good look around inside. One of the nearby surface bunkers has been converted into very pleasant eco-friendly

accommodation, and a former admin block is now a little *pension* which would be a pleasant place to stay. We admired the conversion work, which is very well done, before heading back to the hangar which held the large trenching machine. Before we reached it there was one more little surprise: Manfred proudly showed off his Kubelwagen, a military soft-top Trabant, and after checking the fuel (with a steel dipstick), we were all taken out for a spin in batches of four - Robin did particularly well, being invited to take the wheel! After that, we milled around taking photos until the minibus arrived shortly afterward - a rather dull mode of transport after truck and Trabi, and the less said about the hour-long wait to access passport control in Stansted the better.

All the Germany trips are good, but the vehicle trip was quite different and really good fun. I'm sure I speak for the whole group in offering a very big thank you to Manfred, Helmut and our other hosts; Mike Barton for arranging access, accommodation and sharing the Gottow notes with us and Robin Ware for arranging everything else.

The book *Hitler's Scientists* (John Cornwell, Penguin 2003, ISBN 978-0140296860) mentions Gottow briefly and has a chapter on the V-weapons.

Plans by Mike Barton redrawn by Tim Robinson.

From The Archives

Underground Quarries for stone for making turned pots in 17th century Italy

Gilbert Burnet, Bishop of Salisbury [1643 - 1715], visited continental Europe during the 17th century, and as a result published his *Travels. Some letters containing an account of what seemed most remarkable in Switzerland, Italy, etc.* (1686 and various later editions to 1724.) He was fascinated, in Lombardy, by the quarrying of stone underground, and the use of a water-powered lathe to turn the stone blocks into cooking-pots. His observations were reprinted in 1703 in Richard Neve's book *Arts improvement*, as follows:

Now we are Treating of *Stone Quarries*, I will here add an *Observation* of the Reverend *Gilbert's*, Lord Bishop of *Sarum* .. Of *Pots*, which are turned out of *Stone* ..

.. there are about Three Mines (or Quarries) of it known in these Parts; one near *Chevennes*, another in the *Valteline*, and a third in the *Grisons*; but the first is much the best. They generally cut it [the stone] in the Mine, round, of about one Foot and an half Diameter, and about one Foot and a quarter thick; and they work it in a Mill, where the Chizzels that cut the Stone are driven about by a Wheel that is set a going by Water, and which so ordered, that he, who manages the Chizzel, very easily draws forward

the Wheel out of the course of the Water: They Turn off first the outward Coat of the Stone, till it is exactly Smooth; and then they separate one Pot after another by these small and hooked Chizzels, by which they make a Nest of *Pots*, all one within another; the outward and biggest being as big as an ordinary Beef-Pot, and the inward *Pot* being no bigger than a small Pipkin; these they Arm with Hooks and Circles of Brass, and so they are served by them in their Kitchens. ..

The Passage to this Mine (or Quarry) is very inconvenient; for they most creep into it for near half a Mile, through a Rock that is so hard, that the Passage is not above Three Foot high; and so those that draw out the *Stones* creep allong upon their Belly, having a Candle fastened to their forehead, and the *Stone* laid, on a sort of Cushion made for it, upon their Hips: the *Stones* are commonly Two Hundred Weight.

Burnet's *Letters from Switzerland*, 94, &c.

This is of some interest, as descriptions of underground quarries are uncommon this early, and the quotation also indicates some confusion between the terms mine and quarry.



Istanbul's High-Risk Tunnels under the Bosphorus

Julian Allason

Istanbul, a city with an underground tradition more than two thousand years old, is adding an impressive - but risky - new tunnel to its warren of subterranean escapes.

With several million cars commuting daily between the Asian and European sides of Istanbul, the pressure on ferries and the city's two bridges across the Bosphorus Straits became critical several years ago. Works on a £2 billion railway tunnel expected to be completed by 2012 - two years late - are now advancing. They have not proved straightforward however - for a variety of reasons.

The narrowest parts of the Bosphorus are very deep, thus the Marmaray Tunnel is having to be run for nearly a mile across the waterway's wider mouth where it flows into the Sea of Marmara. The route passes close to the famous landmark of Leander's Tower (the lighthouse island on which Brosnan's James Bond was imprisoned and subjected to seduction by Sophie Marceau in *'The World is not Enough'*). The route curves towards the Golden Horn, surfacing at Yenikapi on the European side, below the Blue Mosque.

Given that major cruise ships, loaded gas carriers and Russian warships use the channels continuously, it will necessarily be the deepest underwater tunnel in the world at 58m below the surface at the lowest point.

Engineers are presently working 24 hours a day to inject concrete into the seabed onto which the tubes can be placed. Twin rail tunnels are being fashioned from steel-reinforced concrete on land in eleven sections. These are then to be floated into position and sunk onto the strengthened sea bed and back filled. Istanbul is on a seismic fault line so the tunnel will

also have to withstand earthquakes of up to 9.0 on the Richter scale.

With unstable substrata, the engineers have had to adopt the controversial New Austrian Tunnelling Method. This involves using spray-on concrete ('shotcrete') to solidify the ground around the tunnel. Previous tunnels on which this approach has been used have exhibited a tendency to collapse during construction, as one did in Munich in 1994, killing four and injuring 27.

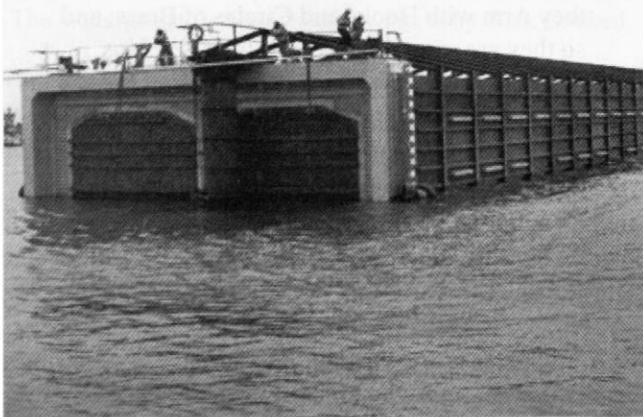
Workers digging out the Yenipaki terminal have also hit archeological opposition after discovering a major Byzantine harbour dating back to the time of



Constantine the Great, circa 340 AD. Work on the ambitious new railway hub will have to wait for the archeologists to finish. No one is holding their breath.

Once finished, the tunnel will dwarf the 'Underground Palace', an arched and columned reservoir large enough to float a galley. This cistern, which is open to the public, served as a location in *'From Russia With Love'* for James Bond Connery's subterranean voyage to a cave beneath the Russian consulate where SIS station chief Kerim Bey had installed a periscope looking through a mousehole in the KGB conference room.

Tunnelling runs deep in Istanbul's culture, so much so that the city was chosen as the venue for the 2005 World Tunnelling Conference at which a number of issues relating to sub-sea bores were resolved. The city, particularly its fortifications and palaces, is riddled with subterranean passages that may, with varying degrees of difficulty, be accessed by visitors. The portals to several of these are also to be found in the crypts of churches of various denominations. Hotel concierges and the city tourist office can sometimes arrange access.



Prefabricated sections of the tunnel being floated into position

Chislehurst Caves in World War One

Rod LeGear

Even before the publication of Dr William Nicholls' two controversial papers on Chislehurst Caves in 1903 and 1904 the old chalk workings had been, as today, a popular tourist venue. The Bickley Arms, in whose grounds the entrance lay, had installed 'electric glow lamps' in the outer series of caves and charged a few pence for admission.

Munitions Storage – A Problem

With the build-up to war in 1914, Woolwich Arsenal dramatically increased the production of high explosives but was having storage problems. Munitions from Woolwich were sent to shell filling stations around the country and also directly to the front lines in France. Short-term storage at Woolwich between production and transportation was, by October 1914, becoming increasingly scarce. An internal memo from the Chief Superintendent Ordnance Factory (CSOF) stated, "... we have approx. 200,000lbs of Trotyl and 100,000lbs of Picric Acid plus 184,000lbs of Waltham Abbey Acid; of this last 150,000lbs is scattered in heaps on the marshes protected by tarpaulins, but the rest is under cover".

Several sites external to the Arsenal were appraised and eventually, after a number of visits including one by the Chief Superintendent, the tourist attraction of Chislehurst Caves was chosen as a suitable location to site an underground magazine.

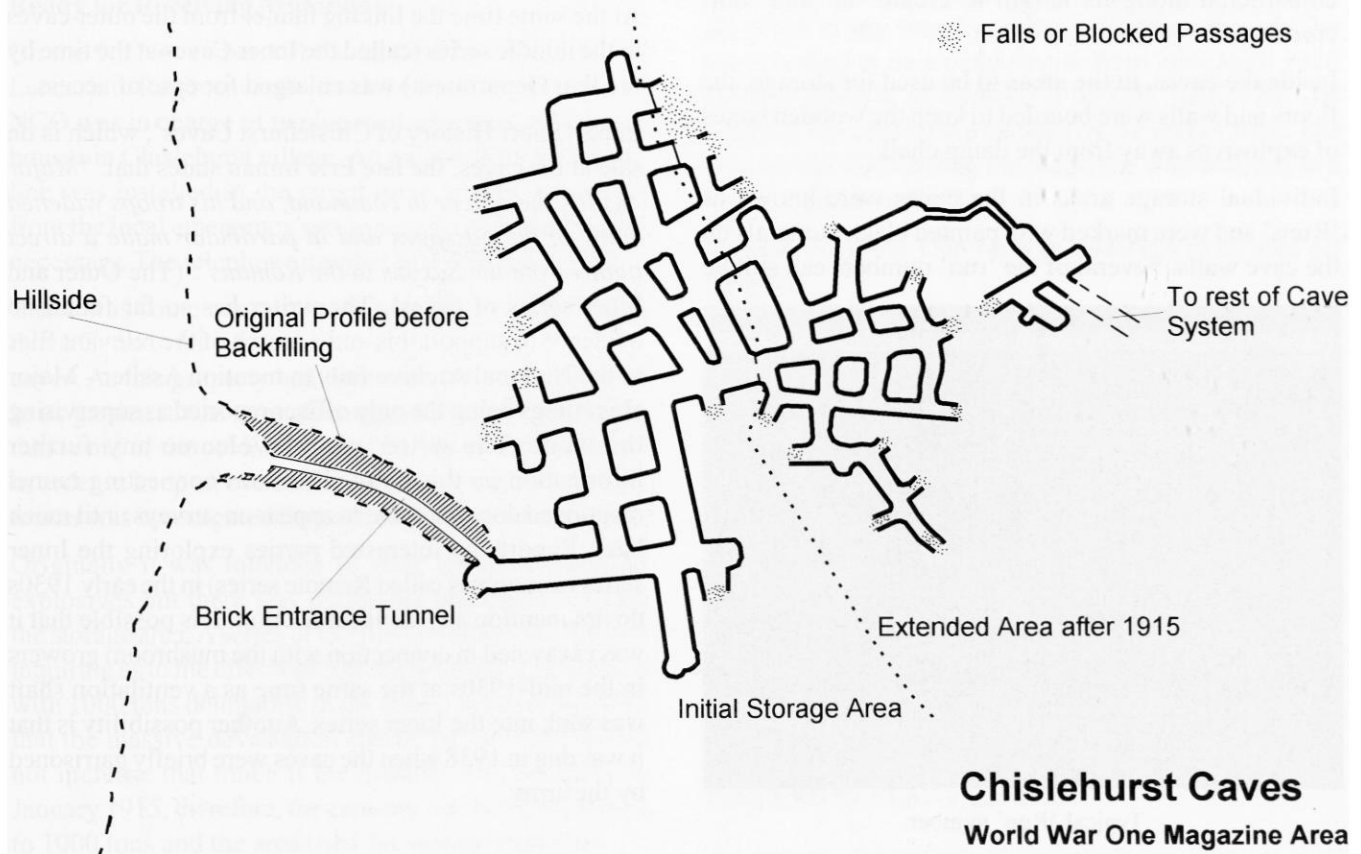
After a series of meeting with Trust House, the owners of The Bickley Arms, an agreement was signed in which the caves were rented at £4.00 per week and a small meadow in front of the caves at £3.00 per year giving a total rent of £211 per year.

When the caves were just a tourist curiosity the local authority rated them at £24. This was, however, increased to £64 after the War Dept. took occupation, "*in consequence of alterations and new use*".

Local residents living in the large houses above the caves were extremely concerned when they found out that the Arsenal were going to use the caves and several wrote to the War Office to protest at the use of the caves as an ammunition store. A reply from a Mr. B. B. Cubitt of the Arsenal stated, "*I am commanded by the Army Council to inform you that it is not proposed to store ammunition as such in the caves, but only the ingredients*". As the said ingredients were Picric Acid (Trinitrophenol) and Trotyl (Trinitrotoluene), both high explosives, I suspect that did little to allay their fears.

Conversion of the Caves

Work began to convert the chalk caves to a magazine in November 1914 under the supervision of Major Hemmings RE, the Superintendent of the Arsenal Works Department. A tender for the work was won by Messrs



R F LeGear MAAIS AIFA 2007

Rider and Sons for £638 on 9th November. Externally a number of wooden buildings were constructed near the entrance which included latrines, dining room and guard hut.

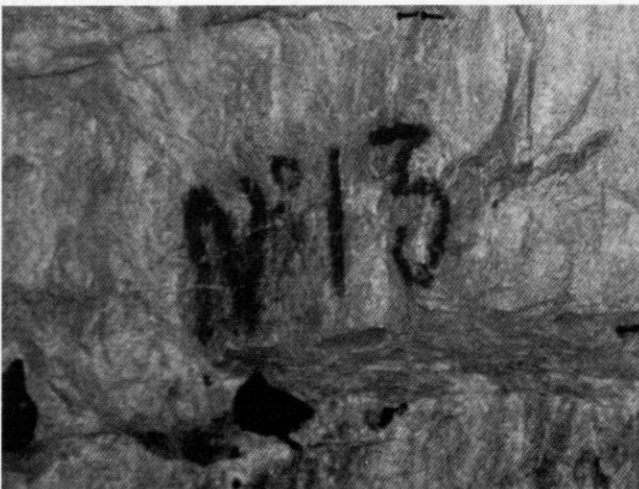


World War One Guard Hut and Dining Hall. These huts were used by Chislehurst Caves until the early 1990s
Photo Kent Mushrooms Ltd.

The side of the hill above the caves was recontoured and the entrance strengthened by the construction of a brick corridor along a gap in the hillside from the old cave entrance to the edge of the old quarry face. As part of the contouring work earth was piled on the roof of this corridor to create a brick "tunnel" through backfill. This tunnel was widened in 1941 as part of the 'General Improvement Works' when the caves were used as an air raid shelter. At the same time a dividing wall was constructed along its length to create 'in' and 'out' corridors.

Inside the caves, in the areas to be used for storage, the floors and walls were boarded to keep the wooden boxes of explosives away from the damp chalk.

Individual storage areas in the caves were known as 'Runs' and were marked with painted black numerals on the cave walls. Several of the 'run' numbers can still be



Typical 'Run' number.

seen in the outer series of caves. These should not be confused with the smaller Second World War pitch numbers which marked the location of allocated bunks when the caves were used as a shelter for up to 15,000 people a night.

Brick walls, some with stout steel doors, were erected to seal off the magazine area from the rest of the caves. One of the old haulage shafts for the Inner series of caves had its surface grill replaced with a '*strong iron grating embedded in concrete*'. To make absolutely sure that the



Remains of steel guard bars in Highclere Shaft.

shaft was intruder-proof, a set of steel guard bars $\frac{7}{8}$ in dia. were fixed across the shaft 3° inches apart about 10ft from the bottom.

At the same time the linking tunnel from the outer caves to the middle series (called the Inner Caves at the time by the War Department) was enlarged for ease of access.

In his 'Short History of Chislehurst Caves', which is on sale at the caves, the late Eric Inman states that: "*Major Assiter, the officer in command, and his troops widened many of the passages and in particular made a direct tunnel from the Saxons to the Romans*" (The Outer and Inner series of caves). The writer has so far found no evidence to support this and a search of the relevant files in the National Archive fails to mention Assiter - Major Hemmings being the only officer reported as supervising the work. The writer would welcome any further information on this point. The short connecting tunnel mentioned does not seem to appear on surveys until much later. Reports by interested parties exploring the Inner series (sometimes called Remote series) in the early 1930s do not mention any such connection. It is possible that it was excavated in connection with the mushroom growers in the mid-1930s at the same time as a ventilation shaft was sunk into the Inner series. Another possibility is that it was dug in 1938 when the caves were briefly garrisoned by the army.

Security and Access

It was originally proposed to fit electrical alarms to the three sets of steel doors sealing the storage area. These alarms, which were to have rung in the surface guardhouse, were, however, never fitted.

By the end of November about 150yds of Decauville Tramway (18in gauge) had been laid, together with points and turntables, to transport the explosives from loading platforms on the surface to each part of the storage area. A small battery-powered locomotive provided the motive power.

The electric lighting run into the caves before the war was improved with the Bromley Electric Light and Power Company Ltd installing wires for 24 points in the Outer and Inner caves for £20. The specification of the wiring stated: *“Three-core cab-tyre cable should be used – the third core to be used as earth wire for all fixings..... To be cleated up to wooden blocks in the roof and not hung or stretched as proposed”*. The electricity meter was still located in the Bickley Arms and the War Dept was being charged at 4fd per unit.

In December 1914 Major Hemmings gave strict orders to place *“a blank strip over all adverts in Chislehurst, London and elsewhere advertising the caves”*. For obvious reasons tourism at this time was very actively discouraged. This prompted the landlord of the Bickley Arms to seek compensation from the War Dept for the loss of revenue from the guided tours and the sale of picture postcards.

Ready for Receiving Munitions

On the 9th November 1914 soldiers of the Royal North Lancashire Regiment arrived to take up guard duties. One NCO was in charge of twelve men who were billeted in houses in Chislehurst village. An ex-directory telephone line was installed in the guard room so that assistance from the local emergency services could be summoned if necessary. The telephone number was BROMley 1882.

There was some consternation when it was discovered that a German national was staying in a house above the caves. As this property had one of the old haulage shafts in its garden it was strongly suggested by the War Dept. that some of the soldiers should be billeted at the house in order to keep an eye on him. However, by the time the matter was investigated further the chap had moved away.

Originally it was intended to store up to 500 tons of explosives but there was increasing pressure to extend the storage area. A series of memos circulated the Arsenal inquiring as to the effects of 500 tons exploding compared with 1000 tons detonating in the caves. It was concluded that the massive devastation caused by 500 tons would not increase that much if the quantity was doubled. In January 1915, therefore, the capacity was being increased to 1000 tons and the area used for storage expanded.

The explosives were sent to Chislehurst Station by rail from Woolwich Arsenal and then loaded onto lorries for the short drive to the caves where the wooden boxes were transferred to the battery-operated trains via the low loading platforms. Explosives were constantly being moved around as new stocks arrived from Woolwich for short-term storage before being sent on to either the various shell filling factories around the country or directly to France for use in offensive mining operations.

During their time as an underground magazine the caves saw more than a few ‘incidents’; for example in 1915 foul water was getting into one of the shafts in the caves which led to the local authority being forced to make alterations to a sewer in Susan Wood, a road lying above the middle series of caves.

During a thunderstorm in the afternoon of 30th May 1916 dirty water in the soakaway in number 24 Run rose above the level of the wooden boards wetting a quantity of Picric Acid. On the night of 4th November 1916 water overflowed from another sump and some of the Trotyl packages were wetted, but without affecting the contents. On 27th November 1916 there was a fall of chalk in number 4 Run. About 4 cwt of chalk fell onto a stack of Picric Acid – but *‘no damage of any consequence’* was done.

Postwar Usage of the Caves

After the war in 1919 there was discussion as to whether the caves could be used for ‘filled ammunition’. After much debate it was decided that storage at Chislehurst in peacetime was not necessary although the right to reuse the caves in any future conflict would be retained. The caves ceased to be a magazine as from 30th April 1920 and were clear of all explosives by 25th June 1920. The whole of the caves were vacated by the end of June. The contract for dismantling the magazine was awarded to a Mr W. Pollock at £433.

A schedule of the 18in railway materials to be sold off included:

*‘About 500yds of 16lb railway track with steel trough sleepers, fishplates, bolts and clips (including curves)
Five switches (Right Hand, Left Hand and Symmetrical)
Four Cast Iron turntables with ball bearings’*

The total value put on these items was £126.

Not all of the rail stock was removed, however, as a number of later photographs show some track being used by the mushroom growers for transporting horse manure underground in the 1930s. The last rails were finally removed prior to the cave’s use as an air raid shelter in World War 2. The landowner purchased all the buildings and fences from the War Dept. for £750, the sale being completed by 19th August 1920.

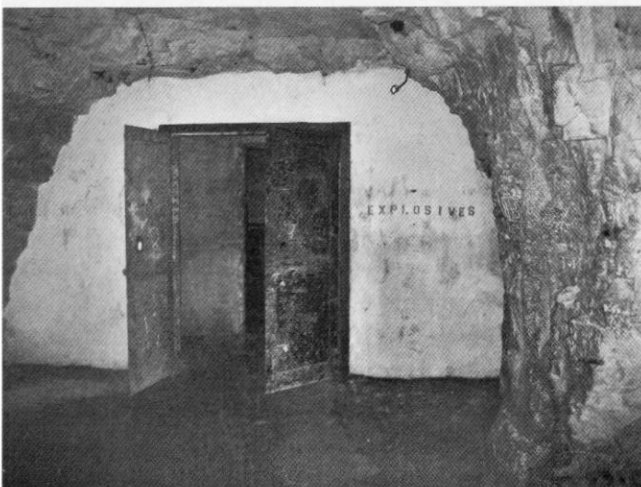
The wooden buildings including the guard hut, dining room and toilet block etc were used by the mushroom business between the wars as offices etc. After the Second World War and up until the early 1990s the huts were used as ticket office, cafe and storage for the caves' tourist trade. When the modern café and gift shop were constructed, the old World War 1 huts had to be removed and now only the base of the latrine block is left. The (now disused) toilet block standing on this old base is



Modern visitors scene

more modern and was taken out of use when the new building was erected.

Today on the public tours, visitors to the caves are shown a tableau of two soldiers guarding boxes of .303 ammunition which is the nearest they could get to the real thing (it is difficult to get hold of display boxes of TNT!). It still possible to spot the 'run' numbers that had been carefully painted on the walls and also some of the figures carved in the soft chalk by bored Arsenal staff. In parts of the magazine not accessible to the general public are numerous names and dates from this time carefully incised in the walls.



Steel Doors from 'Inseminoid' film set.

The heavy steel doors that visitors pass through in this part of the caves look as though they were part of the magazine. They are, in fact, nothing to do with the explosive storage but were erected in the early 1980s as part of a film set for the science-fiction film 'Inseminoid' which was filmed entirely in the caves.

Technical Details of the Munitions Stored at Chislehurst

The two main types of high explosive stored at Chislehurst were Picric Acid and Trotyl. **Picric Acid** (Trinitrophenol), also known as 'Lyddite', was used by the British as a shell filling well into the First World War, despite the many disadvantages. It was difficult to detonate, especially if damp, so misfires were not uncommon. Being an acid it corroded the shell cases so that they had to be lined with an acid-resistant coating. It was sensitive to shocks so was liable to detonate when an enemy shell landed nearby. It also reacted with other metals to form picrates which would explode when subjected to shock or friction.

Trotyl (Trinitrotoluene), commonly known as TNT, was overall less powerful than Lyddite, harder to detonate and more difficult to manufacture. It was, however, cheaper, not so poisonous, did not react with metals and was less sensitive to shock. TNT was also used to create a more economic explosive by mixing it with ammonium nitrate. This produced Ammonal, which came in different grades depending on the amount of the nitrate added i.e. 40, 50 or 80 percent.

At the end of the First World War total production of Lyddite and TNT had passed 275,000 tons. How much of this passed through the caves on its way to the filling factories or the front line is unknown at this time but research is continuing.

Sources

National Archives files: Supp 5/1041 to 5/1046

Chislehurst Caves Archives

R LeGear unpublished research and survey notes 2002 to date.

Underground Features of the Railways in Sweden

Lars A Hansson with additional information from Peter Berggren in Tåg magazine. Translated by Robin Cherry.

There are a number of depots connected with the Swedish Railway system; they were constructed to provide power and equipment storage for the railways in case of war or power supply breakdown. These facilities, of varying type, design and purpose, were among the most secret on the Swedish Railways (SJ) for nearly 50 years.

The first depots

In 1930, four organisations were involved in the planning - the Royal Railway Committee (KJS), the KJS Electronic Bureau, the KJS Military Bureau and the suppliers of the equipment, Asea. The first depots were built at the end of the 1930s and were of great use in the Second World War as alternative supply points. They were kept secret from the Germans, who were using the train network to transport their troops up the west coast on their way to Norway and also to get troops to the Russian front.

During and after the war, several depots were constructed underground in hillsides, giving added protection. Altogether by the end of the scheme there were 55 sites. The last use was in the beginning of the 1990s when a depot was included in the routine improvements to the network. With the changes in the world situation and the lowering of threats, it was decided to wind down the facilities and access is now available to describe the previously secret places.

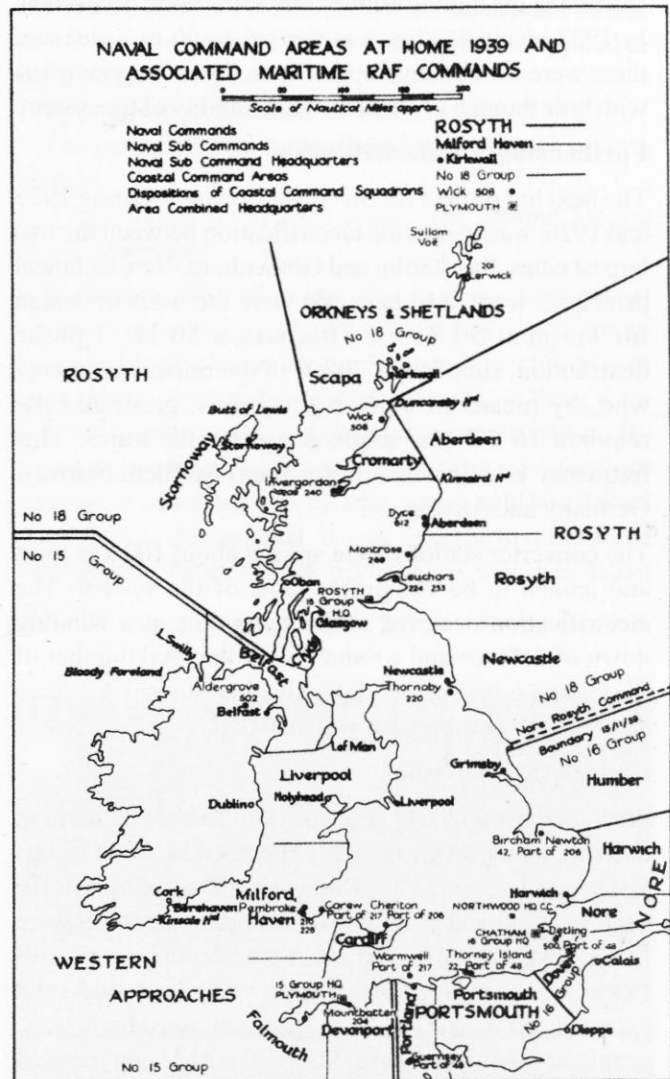
Electrification of the railways

Electrification of the railways took place from 1925 to 1950 over most parts of the system and, until the roads



Storage depot 181 in Saevast became an ordinary converter station later and was in use until 1998 when it was closed.

Photo Peter Berggren



The first 18 storage depots in the autumn of 1938. The lines are for indication only and do not show the extent of the railway electrification at the time.

were made more robust, the railways were the only way of carrying troops and heavy goods around Sweden. From the 1930s, and during the 1940s, considerable strengthening took place to maintain the electrical supply for the railways and in the most part was secret until the 1990s.

The electrification of the railways ran parallel with the spread of electricity in the countryside. When Sweden electrified its first railway (1910 to 1914) between the Kiruna mining district and the Norwegian port of Narvik, it was supplied by dedicated hydroelectric power turbines running at 15 Hz. These were installed at the Porjus hydro dam, where they can still be seen in a museum. A special 80 kV power line was built to carry the power to the railway some 50 km away. This was single phase and power was distributed to the railway at five points via transformers; the final supply voltage was 15 kV.

The transformer houses were brick built and were not camouflaged at the time as there was no likelihood of aerial bombing. Several still exist and one can still be seen along the mining railway line in the north of Sweden. In 1923 electrification was carried south to Luleå and there were further developments on the same principles, with little thought given to the vulnerability of the system.

Further stages of electrification

The next big project for Swedish Railways, during 1925 and 1926, was to provide electrification between the two largest cities, Stockholm and Gothenburg. New technical principles were used here and were the basis of design for the next 50 years. This was a 50 Hz 3-phase distribution, supplied at 70 kV to the railway company who, by means of converter stations, generated the required 16 2/3 Hz, single phase for the trains. This frequency is still in use in (at least) Sweden, Norway, Germany and Austria.

The converter stations were spaced about 100 km apart and tended to be vulnerable parts of the system. The electrification occurred at the same time as a winding down of defence and a reduction in the total number of troops and no particular defensive measures were taken when the new equipment was installed.

Consideration of war

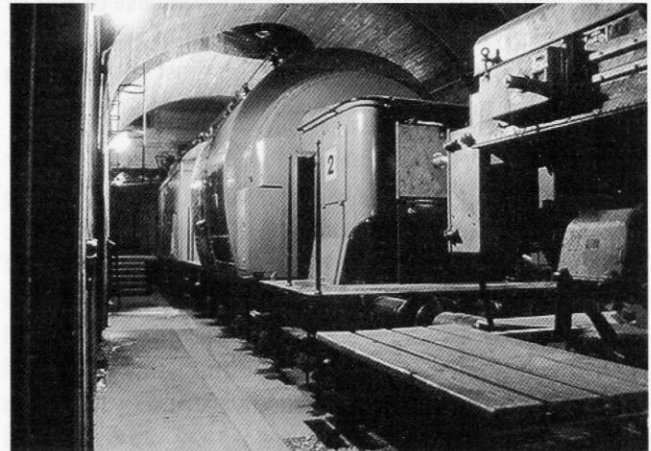
With increasing world tension, 1936 saw an increase in defence awareness, especially the need to move troops and heavy equipment; the Railways embarked upon a 10-year improvement programme. Important measures were however to be completed earlier. Some lines were still steam operated; reserve engines were kept back and exports disallowed. The 1936 budget allowed for reserve supply equipment to be replaced; this had been planned for five years earlier.

The plans for mobile supply equipment had been started in the 1920s. Mobile equipment could be moved to where it was needed to keep the system operating in the normal way; and equipment could be moved to centralise maintenance. Wartime use seemed very remote at this time. Notwithstanding the advantages of the mobile units, many permanent supply installations were made on the trunk routes during the twenties and early thirties.

By the end of the 1940s, the main railway system had been electrified in Sweden. At the same time, the vulnerability from air raids and other military activity brought the authorities to invest in what is believed a unique function for Sweden – protected power supply stations in mountains or hills close to the railway line.

Later, the plan was to use mainly non-protected stations in peacetime and protected stations in wartime, but protected power supply stations were used as required for normal backup. They were situated between the power lines and the railway lines and were usually situated 100

– 500m from the railway. One of the key features with these stations was that everything needed in the transformation of power was placed on trucks and could be moved when the power supply was needed in another part of Sweden.



Inside the converter station at Tillberga in 1997 shortly before closure - from web site :

www.elmuseum.se/?/tillberga_omformarstation.htm

Underground converter stations and depots

There were two different kinds of the protected units around the country with different usage. The ordinary station was called 'omformarstation' (Converter Station). These had two tunnels with railway track running into both of them for the transformer wagons. The second version was the 'upplagsplats' (Storage Depot), usually a bit smaller, with one or two tunnels that were only to be used in wartime or when the main unit was closed for repairs.

At the top of the tunnels a large fan transported the hot air from the wagons up through a shaft, usually at least 20 metres in depth. The main entrance had concrete shock-absorbing sliding doors fitted in such a way to allow some absorption of the shock wave to be taken by the entrance rock. The space inside and along the tunnel sides was very limited but in the two-tunnel version, space was



The shock-absorbing sliding doors at the Söderhamn converter station in 2006. Photo by Nick Catford

available between the tunnels and at the back for small workshop facilities. The three-phase power line entered the site above the concrete blast doors.

The first wagon in the chain was the transformer wagon Q26 that produced 6 kV 3-phase 50Hz. This wagon weighed 50 tons and had four axles. It had a speed restriction of 30 kph. The 6 kV was fed into wagon Q 24/25 or Q38/39 via conductors on top of the wagons. This wagon had a dual purpose. It supplied power to the site at normal, 400V 3-phase; it also supplied the 6 kV 3-phase to the rotary converter, which generated 16 2/3 Hz at 16 kV. This now fed into the Q31 wagon that controlled, measured and fed the 16 kV 16 2/3 Hz to the outside railway line with the necessary circuit breakers and protection.

Changing designs – and confidentiality

The Southern main line had ordered fixed transformer stations for the westerly route but this was changed in 1932 for mobile units. The construction of these had been considerably improved since 1931. The plan was to make improvements for defence purposes and try out different parking places with sidings near supply lines. Following the tests, the electrification of the Stockholm-Ånge line went ahead in 1932 with mobile units. This was a daring decision since the technology wasn't quite proven. After electrification of the southern main lines, all installations went ahead with mobile units until the end of the 1970s.

In the 1920s and early 30s, there was complete openness about the plans, with publications from both SJ and Asea giving details in Swedish and even in English, German, French and Russian. This all changed in the middle of the 1930s when, with the threat of war, the door closed



The converter station at Söderhamn in 2006.
Photo by Nick Catford

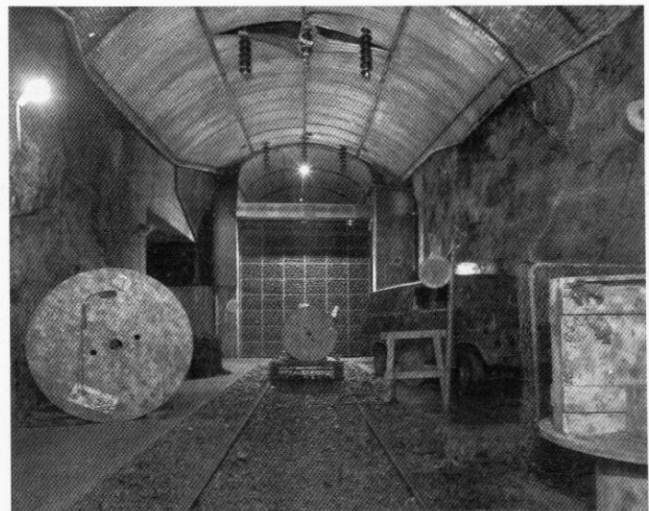
on this free information. Together with aircraft design and other sensitive areas, the railway information was to be kept secret. Attack from the air was now regarded as likely.

Final stages of electrification in readiness for war

There were still many railway lines, including main lines, that were due for electrification and the defence authorities came to the conclusion that each power input point should have a reserve at each location. Three criteria applied to these places:

1. Each power line should be able to supply 5 MW;
2. The base could be camouflaged with trees or set in a hillside;
3. There should be at least 100m² flat ground for the heavy equipment.

In September 1935, all points where a power line crossed a railway were listed as possible locations. On the route between Stockholm and Ånge, 50 power injection places were listed – though fewer were required, so there were options for the location of each transformer station. By use of camouflage, it was hoped to protect the sites from enemies or saboteurs, since a large area would be affected if a unit was deactivated. It was thought that the fixed installations, being visible from the air, would be taken out first.



The converter station at Tillberga in 2006, now used for paintball. Photo by Nick Catford

The first secret bases were planned in detail between 1936 and 1938 and 18 places were nominated. Work started immediately because of increasing world tension. The locations were secret and were only known by numbers. Some complete transforming supply stations were designed to work outside, but were mobile. However, simple protection was later provided against wind and rain.

Earlier types required manual switching in the control van but in 1939 oil-damped switches became available; these would trigger off automatically and quickly in the event of a fault. It also became possible to isolate the power on either side of the point with two breakers installed. However, when Denmark and Norway were invaded on 9 April 1940, not all of the required equipment,

namely the circuit breakers and control unit wagons, was ready and units were taken to their planned depots without these wagons. There was a shortage of copper and oil which delayed their manufacture.

War times

During the war, the secret storage depots were guarded by troops who were specially cleared; but personnel from Asea became involved, allowing newly manufactured equipment to be installed. Germany requested permission to transport her troops through Sweden when she declared war on Russia on 22nd June 1941. 14,712 men from the Engelbrecht Division were transported from occupied Norway along the route Charlottenberg-Hallsberg-Haparanda during the period 25th June until 12th July.

Electrification went as far as Vännäs, the rest was steam operated. With short notice, four of the protected supply points were used along the route. The usefulness of these was demonstrated on 19th July 1941. Train 4352 rolled into track 5 at Krylbo station on its way from Charlottenberg to Haparanda. One of the ammunition trucks exploded and the whole area became severely damaged. This was a week after the Englebrecht Division had passed through. However many more ammunition trucks were to run through this stretch on their way to Germany. The supply depot survived the explosion much better than the train or Krylbo Station itself but even so, steam was again needed to pull trains through Krylbo station until repairs could be made.

Another incident occurred in 1942, when there was a serious fire in the wooden protection shed; this destroyed the supply depot 152 at Hedsjön. The site was unique in that there was no circuit breaker on the incoming 220 kV line and it took four minutes for the incoming supply to be broken. During this time almost everything was totally destroyed. This event led to considerable improvement in the facilities; better fire protection; increased protection for the personnel and the sheds made from concrete and metal instead of wood. Better shrapnel protection was also provided. The most important improvement after this fire was that a circuit breaker was always provided on the incoming mains supply. It was a lesson dearly learned from trying to save money on the scheme.

Burrowing underground

About 1942-1943, more attention was given to putting these supply points in hill or mountain sides, or in concrete buildings with metal roofs. Sweden was experienced at installing hydro-electric generators in mountain sides and this would be broadly similar. The early installations were rather primitive, but improvements continued and since



The converter station at Nyköping is still in use, seen here in March 2008. Photo by Lars Hansson

it was wartime, advice was sought from the department of fortifications. This included protection against grenades, with massive concrete doors at the mouth of the tunnels. The installations not in tunnels were heavily protected with 20cm thick walls of reinforced concrete. Improvements continued after the war including improving the mountings of the rotary converter to reduce the vibration and in 1950 the last hill-built depots were constructed with better disguised ventilation outlets so that they were less easy to spot from the air.

Due to the expense of building new bases within mountain sides, later installations after the mid-50s were in above-ground buildings. Some of the mountain sites were used for the steam reserves and later for the storage of diesel engines but, because of damp, the above-ground sites proved more satisfactory for this. The reserve sites were useful whilst main sites were refurbished and a timetable of testing and changing ran through the 1960s and 70s.

The end of the line

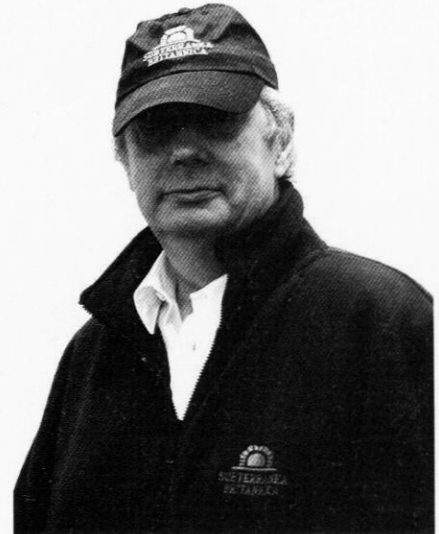
In 1992 defence budgets were cut and many sites were sold as they were expensive to maintain. One of the concrete ones in south Sweden, no longer required for a converter station, was used for the steam/diesel reserve for about twenty years. After that it became a storage facility for local merchants.

Today, most of the two versions of the hill or mountain protected stations are vacated or destroyed. The last station with original kit was the Tillberga station that some Sub Brit members visited in 2006. It had then been converted into a paintball arena after ceasing in its original purpose in 1997. In the north, a railway museum has taken over a station and has some of the original wagons in its museum.

SUBTERRANEA SHOP - PRICE LIST AND ORDER FORM



SUBTERRANEA BRITANNICA



All items are in Navy Blue with the Subterranea Britannica logo and name in light blue

Item	Size	Price	Qty
'Fruit of the Loom' Sweatshirt	S-36" M-38" L-40 to 42" XL-44 to 46" XXL-48"	£20.95	-----
Cotton polo shirt	S-36" M-38" L-40 to 42" XL-44 to 46" XXL-48"	£18.95	-----
Baseball cap, unlined	One size fits all	£9.95	-----
Boiler suit	S M L XL	£32.95	-----
Full zip fleece	S M L XL XXL	£28.95	-----
Total purchases	Value	£	-----

Name

Please debit my credit card: Visa/MasterCard

Address

Number

Post code

Expiry date

Telephone number

Signature

Postage and packing will be added at cost.

If you prefer to pay by Cheque, please telephone first to obtain postage and packaging cost.
Other items are available on request, please telephone for a quotation.

Please photocopy and return this order form direct to;

Rainbow Copy & Embroidery Services,
Unit 10, Lymington Enterprise Centre, Ampress Lane, Lymington, Hampshire SO41 8LZ

Tel/Fax 01590 673 186 e-mail: sales@rainbowcopy.co.uk



